Conflicting Psychologies of Learning

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PREFACE

During recent years there has been much activity in the field of psychology. New movements are appearing, and old beliefs are undergoing criticism and revision. In spite of the fact that psychology prides itself on being a science, its deepest problems are of a kind that cannot be solved by the application of scientific technique. These problems are problems of interpretation, and they all trace back to the fundamental problem of the nature of mind. Consequently, psychology at present is a scene of confusion and violent disagreement. There is a steadily mounting mass of data, but we do not know what they mean.

When considered as part of a teacher's professional equipment, psychology is of significance for the light that it sheds on the nature of the learning process. To the teacher it is all-important whether the learning process centers in habit-formation, or the cultivation of "insight," or the untrammelled development of original tendencies. Unfortunately, the choice among such alternative views cannot be decided by appeal to experiment. In the end it must rest on a theory of mind, and the considerations which determine our theory of mind extend far beyond the data of experimentation. This may be a hardship for the teacher, but it cannot be helped. For the teacher, a study of psychology that does not clarify his thinking regarding the nature of mind is Hamlet with Hamlet left out.

That much of our educational psychology does not concern itself greatly with the question of the nature of mind

appears to be an indubitable fact. The things which receive major attention are, by comparison, of a trivial kind. The student may not even suspect that, from the point of view of educational practice, there is no such thing as psychology. There are only psychologies.

The central theme of this book is the nature of mind. It is written in the conviction that the question of mind is of central importance, both for teaching method and for our whole program of education. The treatment is limited to those theories of the learning process which are of outstanding importance in the determination of educational practice. The order of presentation is semi-historical, for the reason that this form of presentation seems best suited to the purpose of assisting the student in arriving at an intelligent conclusion regarding the nature of mind. To readers who may be averse to discussions of a philosophical kind it is suggested that Chapter XII be omitted.

It gives me pleasure to make special acknowledgment of my indebtedness to the writings of John Dewey. I wish also to express my appreciation of the generosity with which the publishers mentioned in this volume have granted permission to quote. A part of the final chapter was printed earlier in the *Teachers College Record* for December, 1928, in an article on "The Most Outstanding Next Steps for Curriculum Makers in the United States." Lastly, I desire to record my obligation to Dr. P. T. Orata, who gave much valuable assistance in the preparation of the manuscript.

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TABLE OF CONTENTS

CHAPTER I

THE DISTINCTION BETWEEN MIND AND BODY

To the average person the distinction between mind and body is a familiar and obvious fact. The body is an object that makes itself known to the senses; the mind is an immaterial reality inside the body, presumably in the head, which thinks and feels and wills, and which is in control of the activities of the body. The outstanding difference between a human being and an inanimate object lies in the fact that human beings have minds, whereas inanimate objects do not. Consequently there is an enormous difference in behavior in the two cases. Inanimate objects are merely dead matter, whereas human beings are alive and responsible for what they do.

The distinction is so self-evident that it hardly occurs to our average person to make any difficulty about it. Though some people, and especially his pastor, may have talked to him about his mind or soul,[1] he was never taught, as far as he can remember, to distinguish between mind and body. This distinction is thrust upon him by the facts themselves. The distinction itself is almost as inevitable as the distinction between a house and a tree. We notice the difference as soon as we are capable of intelligent observation.

[1] The reader is requested to note that the terms, mind and soul, are used interchangeably throughout this book. They are treated as synonyms because, as far as our present purpose is concerned, they mean the same thing.

The fact that this is, in general, the attitude of the common-sense man shows how easy it is to identify the familiar with the self-evident. That the distinction between mind and matter, far from being self-evident, was slowly wrought out through ages of reflective thinking scarcely occurs to the average person. Nor is he likely to realize that this distinction is full of obscurities and difficulties. He simply accepts or absorbs this distinction, which has become an integral part of his spiritual heritage, in much the same way as he acquires a knowledge of the number system or of his mother tongue. All these things are as much a part of his environment as the ground on which he treads or the flowers of the field. Consequently he takes them all for granted. By the time he is grown up he has established certain habits of thinking, and any other ways of thinking are apt to strike him as strange and unnatural.

The point of the foregoing comments is that the concepts of mind and matter, as they come down to us, represent *achievements* of thinking and not starting-points of thinking. We are now in possession of these concepts, not because they are self-evident, but because the thinking has been done for us. If we take a glance at the more primitive levels of culture, we find there is no such distinction between mind and matter as we have today. Let us consider first the notion of matter. We talk of matter as "dead" or "mechanical." No matter acts purely in and of itself, but only in relation to other forms of matter. This notion has been made familiar to us by the physical sciences, which have traced out in considerable detail the laws or conditions under which material bodies act. The time was, however, when very little was known about all this. Consequently material bodies were

supposed to act quite spontaneously, without reference to other bodies. There was no " dead " matter, but all things were " animated," *i.e.*, they acted for reasons of their own and in response to inward prompting. Every object in nature was supposed to act from essentially the same causes and motives as human beings. This belief or attitude is sometimes known as Animism.

It is easy to see now that this attitude was inevitable. Primitive man did not know why the river rose and became a flood, why the winds blew, why the sun moved about in the sky, or why the lightnings descended to rend and destroy. Consequently he explained these actions in terms of his own behavior, which was the only explanation accessible to him. In other words, he took for granted that these things were all done " on purpose." Animism means that " man recognizes in every detail of his world the operation of personal life and will." [2] His world was not a universe, *i.e.*, a system of interrelated facts, but a collection of independent things. These independent things, he thought, operated spontaneously and not in accordance with universal and immutable laws, and so primitive man did not have a conception of " dead " matter to set over against the conception of a free and purposive mind.

" The wild native of Brazil would bite the stone he stumbled over, or the arrow that had wounded him. Such a mental condition may be traced along the course of history, not merely in impulsive habit, but in formally enacted law. The rude Kukis of Southern Asia were very scrupulous in carrying out their simple law of vengeance, life for life; if a tiger killed a Kuki, his family were in disgrace till they

[2] Tylor, E. B., *Primitive Culture,* Vol. I, p. 285. Henry Holt & Company.

had retaliated by killing and eating this tiger, or another; but further, if a man was killed by a fall from a tree, his relatives would take their revenge by cutting the tree down, and scattering it in chips. A modern king of Cochin-China, when one of his ships sailed badly, used to put it in the pillory, as he would any other criminal. In classical times, the stories of Xerxes flogging the Hellespont and Cyrus draining the Gyndes occur as cases in point, but one of the regular Athenian legal proceedings is a yet more striking relic. A court of justice was held at the Prytaneum, to try any inanimate object, such as an axe or a piece of wood or stone, which had caused the death of anyone without proved human agency, and this wood or stone, if condemned, was in solemn form cast beyond the border." [3]

This attitude towards inanimate objects and lower animals is not confined to antiquity or to groups of different stock from our own. It is related that in France, in 1457,

"A sow and her six young ones were tried on a charge of their having murdered and partly eaten a child; the sow, being found guilty, was condemned to death, the young pigs were acquitted on account of their youth and the bad example of their mother." [4]

The disposition to deal with inanimate objects and lower animals as though they were human beings was the natural outcome of the assumption that things act in independence of one another. In proportion as the causes of events were better understood, it became possible to distinguish more adequately between mechanical and volitional activity. Thus we now know that lightning is a form of electricity and operates in accordance with certain laws; that rainfall depends on conditions of evaporation

[3] Tylor, E. B.—*Ibid.*, p. 286.

[4] Westermarck, E., *The Origin and Development of the Moral Ideas*, Vol. I, p. 257; quoted by Dewey and Tufts, *Ethics*, p. 459. The Macmillan Company.

and condensation; that diseases occur in accordance with fixed laws of nature; and that the principles of mechanics, which determine earthquakes, landslides, the fall of trees, and the sailing of vessels, are of universal application. In so far as events are the results of such principles or laws, it is futile and stupid to have recourse to either supplication or punishment. The action of inanimate objects is determined, not by motives or any other purely inner causes, but by external circumstances or causes. These objects are just "dead" matter, having no motives or purposes of their own, but controlled wholly by external agencies.

The full realization of this insight we owe chiefly to science, and we were a long time acquiring it. The earlier forms of this view were embodied, not in science, but in magic. The element of truth in magic lay in the conception that events could be controlled through the manipulation of causes. Its error consisted in its notion of what would serve as a cause. Sometimes it proceeded on the principle that like produces like, as exhibited, for example, in the belief that eating pulverized mummy would cause longevity, that eating the heart of a lion would give courage, and eating the flesh of a deer would cause timidity, that whistling would raise the wind, that squirting water from the mouth would produce rain, etc. At other times it had recourse to incantations or secret rites in order to accomplish its results. This uncritical treatment of causes has its counterpart in such modern practices as knocking wood, throwing a pinch of salt over the shoulder to ward off bad luck, carrying a rabbit's foot or lucky penny, and the like.

The difference between this sort of thing and what we

call science is that the latter has a special technique or procedure for the testing of causal connections. In proportion as causal connections are established by scientific methods, the element of personification, which is characteristic of animistic beliefs, disappears. The accumulation of scientific results has borne fruit in the conception of the physical universe as a system of interlocking causes, in which every event is determined in rigidly mechanical fashion. To the scientist the notion that each planet is guided through the heavens by an angel or spirit, or that there is such a thing as "music of the spheres," is either merely poetry or else silly superstition, according to his temperament or mood. In either case he wants it distinctly understood that he does not take such suggestions seriously. His idea of explanation is to translate the phenomena of the heavens into terms of the law of gravitation, which can be stated in quantitative form, and which can be made the basis of prediction by means of mathematical calculations. This type of explanation is not merely a more dependable formulation of causal connections; it is also an elaboration or refinement of our ideas regarding the nature of matter.

Let us now turn for a moment to the conception of mind or soul. More or less concomitantly with this development of the concept of matter there took place a corresponding refinement in the conception of mind or soul. The evidence tends to show that in the earlier forms of culture the notion of "mind," or "soul," covers everything that we designate by such words as breath, life, and spirit. As a well-known writer says: "A certain crude distinction between soul and body, combined with the idea that the soul may act where the body is not, is

suggested to the most savage races by familiar psychical phenomena, particularly by those of dreams."[5] The point is, however, that this early notion was so crude as to bear only a general family resemblance to the conception of mind that was eventually developed from it and that we now tend to regard as self-evident. Apparently it did not occur to primitive man that this mind, or soul, was an immaterial, non-spacial entity. It was to him more like an image or shadow, a conception that has left us the word *shade* as a name for the soul, just as the original meaning of soul as breath has bequeathed to us the term *spirit*.[6]

Up to a certain point the advance of knowledge, as typified by science, meant a narrowing of what was included under the conception of mind or soul. The life of the body is no longer a part of the mind or soul, but is now interpreted in terms of physiological functioning. What we call life has been annexed to the system of physical, mechanical nature which science has so laboriously built up. We now distinguish between life and mind.

> "The elements of living matter are identical with those of mineral bodies; and the fundamental laws of matter and motion apply as much to living matter as to mineral matter; but every living body is, as it were, a complicated piece of mechanism which 'goes' or lives only under certain conditions."[7]

But while the notion of mind was thus being limited in one direction, it was being expanded in another. The

[5] Smith, R. W., *The Religion of the Semites,* Chapter III, p. 86. A. & C. Black.

[6] From the Latin word *spiritus,* meaning *breath.*

[7] Huxley, T. H. Quoted by Karl Pearson in *Grammar of Science,* p. 329.

sharpening of the contrast between the physical and the non-physical had the effect of developing those traits or characteristics of the mind by which it was supposed to be differentiated from matter. Matter is spacial; the mind is non-spacial. Matter is subject to the rigid and universal laws of nature; the mind is free and responsible for its acts. Matter is corruptible; the mind is incorruptible. Matter is confined to the present; the mind can live in the past and in the future. Matter is a collection of atoms, with no destiny but blind, unending movement; the mind is an independent source of goodness, beauty, and truth.

This, in rough outline, is the conception of mind and of matter that has become embodied in our common heritage and that determines the character of our thinking. The common man in his commonness does not often devote much thought to the subject. As a rule, however, he is disposed to accept a statement like the foregoing of the contrast between mind and matter as substantially correct. He naturally does not realize that these conceptions have behind them a long period of development, that they are theories by which we attempt to explain the facts of experience, and that, like all theories, they are subject to modification in the light of further experience.

Can these conceptions of mind and matter be accepted as final? Of late years the physical sciences have been very active in revising their former conception of matter. This revision involves a reconsideration of fundamental propositions that were supposed to be beyond attack. The whole subject is thus in a state of turmoil. Something similar is going on in the field of psychology, which is likewise being subjected to a shake-up. Traditional

notions regarding the nature of mind are being sharply challenged, and established beliefs are going by the board. So many other interests hinge on our conception of mind that the developments in psychology are of vital importance. The saying in politics, "As Maine goes, so goes the nation," finds a certain parallel here. Our present concern is with these developments in their bearing on education. Every significant change in psychological theory is bound, eventually, to have its repercussion in educational practice. At present the confusion in psychology is duplicated in our conceptions of the nature of the learning process. In the succeeding chapters our first task will be to present the traditional conception of mind more in detail, together with its implications for education, and then to survey the rival theories which are seeking to displace it as a guide to practice.

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CHAPTER II

THE MIND AS A SUBSTANCE OR ENTITY

According to traditional doctrine, mind and body form a sharp contrast. Mind has spontaneity, initiative, independence of action; body, or matter, is inert, passive, and acts only in so far as it is propelled from the outside. It happens that mind and matter are united in man, but the union is a union of opposites. It is, indeed, the strangest union in the world. The two members of the pair are as different as can be. Each is what the other is not.

The man in the street is not, as a rule, very keenly aware of any incongruity in the union of such a strangely assorted pair. He sees no reason why the mind or soul should not reside within the body and be carried about with the body from place to place. Why should not the mind or soul move about in space in the same way as the body? The common-sense man would agree with the philosopher Locke when he says:

"Every one finds in himself that his soul can think, will, and operate on his body in the place where that is, but cannot operate on a body or in a place a hundred miles distant from it. Nobody can imagine that his soul can think or move a body at Oxford, whilst he is at London; and cannot but know that, being united to his body, it constantly changes place all the whole journey between Oxford and London, as the coach or horse does that carries him, and I think may be said to be truly all that while in motion; or if that will not be allowed to afford us a clear idea enough of its motion, its being separated from the body in death, I think, will;

for to consider it as going out of the body, or leaving it, and yet to have no idea of its motion, seems to me impossible."[1]

This sounds like good, plain common sense. Clearly the mind or soul cannot act on the body if they are separated by a hundred miles; clearly also the soul must accompany the body on its travels, and must leave the body at death. All this seems so transparent that it looks like sheer wilfulness to make a mystery of it. Yet the mystery is there, contributed by the fact that the mind is supposed to be an immaterial thing. We may grant that if the mind is in a place a hundred miles away from the body, it cannot act on the body. But if the mind is really immaterial, it cannot be in any place at all, either where the body is or anywhere else. To assume that the mind is in one place rather than another is to assume that it is material, that it needs a certain amount of room, wherever it may happen to be. One might even go so far as to suggest the theoretical possibility of enclosing the body so completely as to leave no interstices between the atoms of the enclosing substance; in which case the mind could never escape from the body, and the individual thus enveloped would achieve immortality here on earth.

The reason why the question seemed so clear to Locke is that he did not reflect sufficiently on the implications of immateriality. He did not stop to consider that if the mind is located in space it must be regarded as simply a sublimated form of matter. If it occupies space it can conceivably be pushed out of that space by something else; that is, we can think of the mind as coming into collision with other things and as exhibiting inertia or

[1] Locke, John, *Essay on the Human Understanding,* Book II, Chapter 23, Section 20. Open Court Publishing Company.

other physical properties. On the other hand, if the mind does not occupy space, the whole question of the relation between mind and body becomes exceedingly obscure. This question has in fact exercised the minds of philosophers and psychologists a great deal. How can a non-spacial thing act on a material entity? The two do not seem to have any common denominator. If we hold that they do somehow interact, shall we say that this interaction involves the use of energy? If so, the amount of energy existing in the material world must be a variable quantity. The body uses up energy whenever it acts on the mind, and this energy has then disappeared. Conversely the mind creates new energy when it acts on the body, and the sum-total of energy is then increased.

The purpose of the foregoing discussion is not to criticize the mind-substance doctrine but to develop some of its implications. Traditional dualism is far less simple and plausible when it is subjected to critical examination than it appears to be on the surface. The quality of mystery is deepened when we inquire into the relation of the mind to our momentary experiences. We sometimes identify our passing emotions, thoughts, and acts of volition with the mind. They then *are* the mind. But what happens when a person is in a dead faint or in a dreamless sleep? Has his mind left him, or shall we say that he still has a mind, although it does not happen to be functioning at the moment? Common sense would say that he still has a mind, but that it is in a state of momentary quiescence of inactivity. The mind is a more or less permanent thing, which is active at some times but not necessarily active all the time.

If we take this view, it follows that the mind is some-

thing different from the stream of individual experiences. We cannot identify the mind with thoughts and feelings if the mind continues to exist when there are no thoughts and feelings. As Bishop Berkeley puts it:

> "Besides all that endless variety of ideas or objects of knowledge, there is likewise *something which knows or perceives them, and exercises diverse operations* — as willing, imagining, remembering — about them. This perceiving, active being is what I call *mind, spirit, soul* or *myself*. By which words I do not denote any one of my ideas, but a thing entirely distinct from them, wherein they exist, or, which is the same thing, whereby they are perceived — for the existence of an idea consists in being perceived." [2]

This contrast between the mind and its experiences or "ideas" (which is the term applied by Berkeley to all our experiences) at once leads us into the question of how the mind becomes known. The mind is not just another experience or idea; it is that which *has* the experiences. The mind can have experience of many things; can it ever have an experience of itself? Or is it like the eye, which can look at all sorts of objects but cannot be turned upon itself so as to become its own object? How do we know that we have a mind at all?

As a partial answer to this question it is asserted that a knowledge of the mind is bound up with a knowledge of objects. Every experience, whatever its object, is at the same time an experience of the subject, *i.e.*, of the mind. It is impossible to have the one without the other. To quote from Sir William Hamilton:

> "*We are immediately conscious in perception of an ego and a non-ego, known together and known in contrast to each other.*

[2] Berkeley, G., *Principles of Human Knowledge*, Section 2. Open Court Publishing Company.

This is the fact of the Duality of Consciousness. It is clear and manifest. When I concentrate my attention in the simplest act of perception, I return from my observation with the most irresistible conviction of two facts, or rather two branches of the same fact; — that I am, — and that something different from me exists. In this act I am conscious of myself as the perceiving subject, and of an external reality as the object perceived; and I am conscious of both existences in the same indivisible moment of intuition. The knowledge of the subject does not precede, nor follow, the knowledge of the object; — neither determines, neither is determined by, the other." [3]

The testimony on this point is abundant. "All consciousness, properly so called, involves the idea of self or the subjective element. To know that I have a sensation is virtually to know myself as having it." [4] "The soul, the subject of past experiences, abides within me, and possesses the power to reproduce and recognize many of those past experiences, forever alive to its own identity in successive thoughts." [5] "I do not see that entity I call 'myself,' but I am conscious that I exist, and that, in a way, is to know and see self, and knowledge of any thing, more absolutely certain, man cannot possess. I know that it is the ego that thinks, wills, and feels, and that in such action the senses take no part." [6] Descartes' famous dictum, *cogito, ergo sum,* I think, therefore I am, sums up the whole matter. In the language of John Locke:

"As for our own existence, we perceive it so plainly and so certainly, that it neither needs nor is capable of any proof. For

[3] Bowen, Francis, *Hamilton's Metaphysics,* p. 195. Allyn and Bacon.

[4] Haven, Joseph, *Mental Philosophy,* p. 49. 1857.

[5] Hill, O. A., *Psychology and Natural Theology,* p. 57. The Macmillan Company, 1921.

[6] Moore, H. H., *Matter, Life, Mind,* p. 135. Hunt and Eaton. 1886.

nothing can be more evident to us than our own existence: I think, I reason, I feel pleasure and pain: can any of these be more evident to me than my own existence? If I doubt of all other things, that very doubt makes me perceive my own existence, and will not suffer me to doubt of that. For if I know I feel pain, it is evident I have as certain perception of the existence of the thing doubting as of that thought which I call doubt. Experience then convinces us that we have an intuitive knowledge of our own existence, and an internal infallible perception that we are. In every act of sensation, reasoning, or thinking, we are conscious to ourselves of our own being: and, in this matter, come not short of the highest degree of certainty."[7]

Assertions of this kind, with all sorts of elaborations, occur over and over again in the literature of the subject. So much energy is expended in arguing the existence of the self as a self-evident fact, that a reader may be pardoned for wondering what the fuss is all about. If the existence of the self is a matter in which we "come not short of the highest degree of certainty," why all the bother? The philosophers seem to "protest too much."

Apparently the reason for this solicitous insistence that the existence of the self is not really open to doubt lies in the fact that the traditional conception of the self or "mind" includes some elements which are not known in this immediate and indubitable fashion. In other words, the traditional conception is a mixture of intuition and inference. This conception holds, not merely that a self is present in every moment of experience, but that this self is simple and immaterial, that it is permanent throughout experience and cannot be destroyed except by an act of God, that it exists in relative independence of matter,

[7] Locke, John, *Essay on the Human Understanding,* Book IV, Chapter 9. Open Court Publishing Company.

and that it is a source of energy or power. This is about what is meant by the doctrine that the mind is an immaterial substance or entity. It would be straining our credulity overmuch to allege that all this may be intuitively perceived with the highest degree of certainty. The line between intuition and inference may be hard to draw, but we can hardly deny that the doctrine is based on inference, in much the same way as our belief that the moon has a "back" side as well as a "front" side, although the back of the moon is never an object of our direct perception.

The characteristic and differentiating trait of this doctrine is that mind is a substance. According to Locke, a substance is a source of energy or power.[8] Other writers emphasize as the distinctive trait of substance that it has existence in itself, *i.e.*, that it is indestructible.[9] A quality or attribute, by contrast, is something that cannot exist by itself. A color or shape or movement, for example, necessarily depends on something else, *viz.*, substance, in which it inheres or to which it belongs. This doctrine that mind is a substance is not, in fact, based exclusively on self-evidence. It is supported by various arguments, the more important of which may, for convenience, be considered under the following heads:

I. *Identity*. Our experiences testify to the fact that personal identity is maintained throughout all the shifts and changes of what we call personal experience. Our bodies may change completely, and our experiences are

[8] Locke, John, *Essay on the Human Understanding,* Book II, Chapter 23, Section 7. Open Court Publishing Company.

[9] Hill, O. A., *Psychology and Natural Theology,* p. 70; The Macmillan Company.

[9] Moore, H. H., *Matter, Life, Mind,* p. 386. Hunt and Eaton.

constantly in process of change, yet we feel ourselves to be the same person that we were a week ago, or a month ago, or twenty years ago. It does not matter in the least that our bodies and our dispositions may undergo extensive changes. No matter how extensive these changes may be, we are nevertheless the same person that we were before. This sense of personal identity does not refer simply to the body, and it certainly does not refer to the fleeting phenomena of consciousness. The sense that I am I, and that I am the same personality throughout all the stretches of an incessantly changing experience, has reference to something else. It seems plausible to urge, therefore, that the sense of personal identity is evidence of the existence of a substantive mind.

The objection will be made that identity is attributed to objects like trees, mountains, houses, etc., without any need of appealing to an underlying substance. Physical things change all the while, yet they seem to have no trouble in maintaining their identity. The assumption that there must be an unchanging substratum or essence in which the identity resides appears to be purely gratuitous. In actual life identity is compatible even with violent changes. Stock illustrations are the Irishman's knife, which, though it had had several new blades and at least one new handle, remained the "same knife"; and the colored man's trousers, which, though they had been mended and patched until there was not a thread left of the original cloth, yet were the same garment throughout. If such things are possible, why make a mystery of the concept of identity?

The answer made to this reasoning is that, when the notion of identity is thus applied, we are dealing with

identity in a secondary or "derived" sense. The idea of identity is first secured from the mind and is then extended to other things on the basis of haphazard resemblance; in much the same way as we first use the word "house" to designate a dwelling and presently apply it to a dynasty, as, *e.g.*, the House of Hapsburg or the House of Hohenzollern. In this latter case the original idea of house has disappeared, and its place is taken by something else. The same thing happens to the idea of identity. We begin with the notion of "simple oneness, sameness, continuity of essence"; this is what the word means. The notion of identity is originally derived from the mind, which possesses this "simple oneness, sameness, continuity of essence." Before we are done, however, we use the word to designate something that does not embody identity at all. The "sameness" of material objects is a different sameness. We cannot prevent such use of language, but we can take pains not to be misled by it.

The moral is that the concept of identity can be applied to inanimate objects only in a limited and more or less metaphorical sense. In the case of a tree,

> "the life-principle is, indeed, one and the same throughout all periods of its existence, but the material organization retains not the same absolute essence, only the same general structure, and form, and adaptation of parts, while the parts and particles themselves are continually changing. It is only in a modified and partial sense, then, not in strict philosophical use of language that we can predicate identity of any material organic existence. We mean by it, simply, *continuity of life* under the same general structure and organization; for so far as it has unity at all, this is it. This enables us to distinguish such an object from any and all like objects of the same kind or sort." [10]

[10] Haven, Joseph, *Mental Philosophy*, p. 253.

In the case of inorganic matter the situation is different. If there is to be identity,

"there must be no change of particles, for the essence of the thing now considered lies not in any peculiarity of form, or structure, or life-principle, all of which are wanting, but simply in the number and nature of the particles that make up the mass or substance of the thing, and if these change in the least, it is not the same essence. There is properly, then, no such thing as identity in the cases now under consideration, since the particles of any material substance are liable to constant changes. It is only in a secondary and popular sense that we speak of the identity of merely inorganic material substance; strictly speaking, it has no identity, and continues not the same for any two moments. . . . There is not *absolute* identity; but there is, after all, *numerical* sameness, and this is what we mean when we speak of the sameness or identity of the object."[11]

It appears, then, that there is no such thing as identity anywhere except in a "secondary and popular sense" apart from mind. "It is only of spiritual, immaterial existence that identity, in its strict and complete sense, is properly predicable, since it is only this class of existences that retains unimpaired, its simple oneness, sameness, continuity of essence."[12] The sense of identity means something more than just continuity of existence, and this "more" seems to require the postulation of a substantive mind.

II. *Ownership*. This subject has been discussed by William James under the topic *Thought tends to personal form*. Each mind, says James,

"keeps its own thoughts to itself. There is no giving or bartering between them. No thought even comes into direct *sight* of a thought in another personal consciousness than its own. Absolute

[11] Haven, Joseph, *Ibid.*, p. 255. [12] Haven, Joseph, *Ibid.*, p. 252.

insulation, irreducible pluralism is the law. It seems as if the elementary psychic fact were not *thought* or *this thought,* but *my thought,* every thought being *owned.* Neither contemporaneity nor proximity in space nor similarity of quality and content are able to fuse thoughts together which are sundered by this barrier of belonging to different personal minds. The breaches between such thoughts are the most absolute breaches in nature." [13]

This "personal form" of experience appears to be a highly peculiar and very significant fact. Everyone will agree that thought is personal, in some sense. Matter is by contrast peculiarly impersonal. We may say with propriety "it rains" or "it thunders," but we cannot say "it thinks" or "it feels." According to the doctrine of a substantive mind, the reason for the difference is that experience centers on an ego or mind. We seem to be obliged to count in the universal presence of an owner or agent to whom these experiences belong and by whom they are directed. We have to do here with a peculiar relationship which we try to express when we say that thoughts *belong* to the mind or are *owned* by the mind. Here again it seems plausible to say that this peculiar fact of personality points to a mind which is never fully immersed in the flux but to which the flux belongs or by which it is supported.

"You can have no shape, no color, no pain, no thought without a something to base them. Motion is unthinkable without something that is moved. Thoughts cannot inhere in nothing, desires cannot proceed from nothing. Inner experience is testimony conclusive that there is within me an ego or self, which is the center and source of my ever changing acts and states. Thoughts and

[13] James, W., *Psychology,* Vol. I, p. 226. Henry Holt & Co. The reader is warned, however, that though James emphasizes the qualities of ownership, he does not subscribe to the doctrine of a substantive mind.

wishes appear and disappear, the thinker or wisher goes on forever. What thought within me a year ago, thinks within me today." [14]

III. *Activity and Freedom.* In the realm of nature events occur through the agency of some outside stimulus. Freight cars move because they are pulled or pushed, powder explodes because heat is applied, plants grow in response to sunshine or rain. Perhaps it would not be far wrong to say that in popular thinking the contrast between "dead" or "mechanical" matter and mind centers on just this point. Inanimate objects are passive. They are pushed and hauled about by external agencies. On the other hand minds have a capacity for spontaneous activity. They have the capacity to operate from within. They are self-determining, and consequently they can be held responsible for what they do.

It is this fact of "inner determination," so it is often held, which gives us the sense of freedom and responsibility. A normal human being has the capacity for choosing the line of greatest resistance, for acting contrary to his impulses and desires. In doing so he feels that he is exercising self-determination.

"It was in my power to have thought, to have felt, to have acted differently. What is more, I not only *might*, but, perhaps, *ought* to have felt and acted differently. I am responsible for having such an inclination as leads to a wrong choice; responsible for my opinions and views which influence my feelings; responsible for my disposition in so far as it is the result of causes within my own control." [15]

This view has the endorsement of common sense. Here again it seems plausible to suppose that this fact of spon-

[14] Hill, O. A., *Psychology and Natural Theology*, p. 66. The Macmillan Company. [15] Haven, Joseph, *Mental Philosophy*, p. 553.

taneity or inner determination is to be attributed to the existence of a mind or soul which controls the activities of conscious beings. Are we not once more compelled to infer the existence of an agent behind the scenes, which is both a source of activity and an object of moral responsibility?

IV. *Immortality.* The question of immortality is of perennial interest. Most people would grant that immortality is not a demonstrated fact, like the roundness of the earth or the existence of other planets in the heavens. It is a fact, however, that the belief in immortality is very widely held. The fact that this belief is so widespread gives it at least an antecedent presumption of being true. This presumption is strengthened if we accept the doctrine of a substantive mind. To destroy a thing means to tear it apart, to cause its disintegration. Since the mind or soul is simple and indivisible, it is as indestructible as the atom. As Berkeley says:

> "We have shown that the soul is indivisible, incorporeal, unextended, and it is consequently incorruptible. Nothing can be plainer than that the motions, changes, decays, and dissolutions which we hourly see befall natural bodies (and which is what we mean by the *course of nature*) cannot possibly affect an active, simple, uncompounded substance; such a being therefore is indissoluble by the force of nature; that is to say — the soul of man is *naturally* immortal." [16]

The doctrine of a substantive mind not only affords a basis for the belief in immortality but gives a very simple interpretation of the phenomenon of death. According to this point of view, death is simply a separation of mind

[16] Berkeley, G., *Principles of Human Knowledge,* Section 141. Open Court Publishing Company.

and body. The body disintegrates; the mind or soul goes to its eternal reward. In other words, death is simply a name for the fact that the temporary union between body and mind has been dissolved. If we do not accept the belief in a substantive mind, it is less simple and easy to believe in immortality.

It is not supposed, of course, that this argument demonstrates the existence of a substantive mind. It does not count as an argument at all, except on the basis of a previous assumption that immortality is a fact. If the belief in immortality is denied, then this argument disappears altogether. If we grant, however, that the belief in immortality has an antecedent presumption in its favor, then it would appear that we have another reason for the belief in the existence of a substantive mind.

V. *Concept Formation.* Human beings constantly employ concepts which through long usage have become familiar. This familiarity blinds us to the fact that these concepts have a somewhat mysterious nature. For example, we deal freely with such ideas as infinity, causation, energy, perfection, force, etc. It does not ordinarily occur to us that such concepts present a serious problem. The problem comes to the surface, however, if we ask ourselves from what source a concept like infinity or perfection could be derived. Anything that comes within the powers of our experience is neither infinite nor perfect. We may believe that space is infinite, but it is quite apparent that nothing visible or tangible is ever infinite. We do not find anything infinite present to our senses directly. The concept of infinity is a construction. It is a manufacture by human minds. This manufacture is considerably more than a mere process of putting facts

of experience together in a quantitative way. We can never attain the experience of infinity by adding spaces together. The addition of spaces can never give us anything which is not measurable; it does not get us off the level of the finite. The concept of infinity, therefore, must have its source within the mind and not outside; in other words, the fact that we have a concept like infinity points to the existence of a substantive mind.

> "That we possess knowledge which we do not derive through the senses must be evident to all who will consider the matter. Our idea of space, for example, is not merely the sum of all the spaces embraced in our experience, but it transcends all possible experience. So of the idea of time. We can acquaint ourselves with things that are very great in extent — the earth, the distances of the heavenly bodies, the profound abysses penetrated by the telescope, but still we know that all these are limited, finite, and we cannot help believing that there is something more, the unlimited, the infinite. No experience can show us that two straight lines cannot enclose a space, or that two parallel lines will never meet, and yet we know that such is the case. We may, indeed, have no adequate conception of the absolute or the infinite, of a creation, of God, or of immortality; but certainly we have ground for thinking that there is something uncaused, something unlimited, that the universe had a beginning, that God is, and the human spirit is immortal. In every direction the intuitions of the Reason overlap the boundaries of experience, and furnish, at least, a ground for enlightened faith. As the Reason is the source of the kind of knowledge now referred to, it may be called rational knowledge." [17]

The situation is similar when we consider a concept like substance or identity. The senses present us with a succession of impressions, but nothing more. They cannot give us *thinghood* or substance.

[17] Wickersham, J. P., *Methods of Instruction*, pp. 44–45. Lippincott.

"Take, for example, this piece of wax; it is quite fresh, having been but recently taken from the bee-hive; it has not yet lost the sweetness of the honey it contained; it still retains somewhat of the odour of the flowers from which it was gathered; its colour, figure, size, are apparent (to the sight); it is hard, cold, easily handled; and sounds when struck upon with the finger. In fine, all that contributes to make a body as distinctly known as possible, is found in the one before us. But, while I am speaking, let it be placed near the fire — what remained of the taste exhales, the smell evaporates, the colour changes, its figure is destroyed, its size increases, it becomes liquid, it grows hot, it can hardly be handled and, although struck upon, it emits no sound. Does the same wax still remain after this change? It must be admitted that it does remain; no one doubts it, or judges otherwise. What, then, was it I knew with so much distinctness in the piece of wax? Assuredly, it would be nothing of all that I observed by means of the senses, since all the things that fell under taste, smell, sight, touch, and hearing are changed, and yet the same wax remains." [18]

In many cases, it is true, the content of our concepts seems to come directly from the outside world through sense-perception. It is through sense-perception that we become acquainted with qualities like hardness, fragrance, whiteness, and sweetness. As long as we limit ourselves to sense-experience, however, we get only particular cases of such qualities. The fact that we have abstractions, *e.g.*, whiteness which is not any particular whiteness, but whiteness as such or in general, remains to be accounted for. In order to explain such abstractions it is necessary once more to bring in a mind as an agency which performs the act of abstraction. Abstract ideas do not just drop in from nowhere; they presuppose a certain activity. As Locke says:

[18] Descartes, R., *Meditations*, Meditation II. Open Court Publishing Company.

"The mind makes the particular ideas received from particular objects to become general; which is done by considering them as they are in the mind, such appearances, separate from all other existences, and the circumstances of real existence, as time, place, or any other concomitant ideas. This is called abstraction, whereby ideas taken from particular beings become general representatives of all of the same kind, and their names general names, applicable to whatever exists conformable to such abstract ideas. Such precise, naked appearances in the mind, without considering how, whence, or with what others they came there, the understanding lays up (with names commonly annexed to them) as the standard to rank real existences into sorts, as they agree with these patterns, and to denominate them accordingly. Thus the same colour being observed today is chalk or snow, which the mind yesterday received from milk, it considers that appearance alone makes it a representative of all of that kind; and having given it the name whiteness, it by that sound signifies the same quality, wheresoever to be imagined or met with, and thus universals, whether ideas or terms, are made." [19]

Concepts, then, are made either by sheer creative activity or by a process of abstraction. In either case they presuppose an agency such as the substantive mind. To the casual eye, at any rate, the explanation of concepts by means of a substantive mind has an undeniable simplicity and plausibility.

Whether or not we regard these arguments as conclusive, it is evident that the belief in a substantive mind is not an exhibition of sheer wilfulness or prejudice. Experience furnishes a variety of facts which, on the surface at least, can be explained most readily and simply by the assumption of a substantive mind. We can readily understand, therefore, why it is that this conception of mind

[19] Locke, John, *Essay on the Human Understanding,* Book II, Chapter XI, Section 9. Open Court Publishing Company.

should have been adopted so widely. It seems entirely safe to say that the great bulk of mankind still holds to this belief. The doctrine of a substantive mind has played an enormously significant rôle in human history. Its influence on educational theory and practice, which will be the next topic for our consideration, is but one of its effects on the course of human development, but this effect alone entitles this doctrine to a prominent place in the history of the race.

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CHAPTER III

THE LEARNING PROCESS FROM THE STAND-POINT OF THE "MIND" THEORY

If we undertake to interpret the learning process in terms of a substantive mind, the suggestion lies at hand that all learning must represent some activity on the part of the mind. But this is only a point of departure. When we inquire into the nature of this activity, we find that it varies according to circumstances. The activity of the mind expresses itself through the use of the sense-organs and through the exercise of memory, imagination, and reflective thinking; which is to say that the mind can operate in a variety of ways, or that it has a number of distinct powers or functions. These powers are known as faculties, such as the faculty of observation, of memory, of volition, and the like.

This doctrine of faculties has achieved a conspicuous place in the history of human thought. The type of psychology which is based on the belief in the existence of such faculties has become known as faculty psychology. The time was when this was the prevailing psychology. According to this point of view,

"Mental activity is, strictly speaking, one and indivisible. The mind is not a complex substance, composed of parts, but single and one. Its activity may, however, be exercised in various ways, and upon widely different classes of objects; and as these modes of action vary, we may assign them different names, and treat of them in distinction from each other. So distinguished and named,

they present themselves to us as so many distinct powers or faculties of the mind. But when this is done, and we make out, for purposes of science, our complete list and classification of these powers, we are not to forget that it is, after all, one and the same indivisible spiritual principle that is putting forth its activity under these diverse forms, one and the same force exerting itself — whether as thinking, feeling, or acting — whether as remembering, imagining, judging, perceiving, reasoning, loving, fearing, hating, desiring, choosing. And while we may designate these as so many faculties of the mind, we are not to conceive of them as so many constituent parts of a complex whole, which, taken together, compose this mysterious entity called the mind, as the different limbs and organs of the physical frame compose the structure called the body. Such is not the nature of the mind, nor of its faculties." [1]

With this conception of the nature of the mind and of its faculties as a starting point, how are we to proceed in the business of education? The answer is simple. Education is effective in proportion as these faculties are trained to function properly. The pupil must learn to observe and remember, to use his power of imagination and of critical, reflective thinking. In other words, all education must be centered on the training of the faculties. There is just one way in which this can be done.

"No means are known whereby the faculties of the mind can be developed but by exercising them. By the potent spell of the magic word Exercise, is evoked all human power.

"The proof of this proposition is found in multitudes of facts. The senses grow more acute by using them. The memory is improved by remembering, the reason by reasoning, the imagination by imagining. All these powers, too, become weak if not used. These facts may be learned from each person's own experience, or from observation upon others. The law inferred from them is fixed and universal." [2]

[1] Haven, J., *Mental Philosophy*, p. 29.

[2] Wickersham, J. P., *Methods of Instruction*, p. 38. Lippincott.

People frequently say that children are sent to school in order that they may " learn something." The schools do, in fact, spend much time in imparting information. Moreover, the examinations which are given from time to time are usually tests of information. But if faculty psychology is correct, this emphasis on information is misplaced. The important thing in education is not information but the strengthening of the faculties, so that they can meet new situations more effectively than before.

The view that information is of secondary importance in education has considerable plausibility. It is true that a certain fund of information is necessary for the conduct of the affairs of life. But people do not differ in efficiency in strict proportion to their knowledge of facts. Some people, as James says, have an unusual *desultory* memory; they " retain names, dates and addresses, anecdotes, gossip, poetry, quotations, and all sorts of miscellaneous facts, without an effort." It sometimes happens that imbeciles have an extraordinary memory of this kind. " The mere organic retentiveness of a man," as James says, " need bear no definite relation to his other mental powers." As evidence he quotes from the report of another psychologist regarding the case of a young man whose general mentality was so poor that he " had with difficulty been taught to read and speak." But in spite of this mental inferiority, " if two or three minutes were allowed him to peruse an octavo page, he could then spell the single words out from his memory as well as if the book lay open before him. . . . That there was no deception I could test by means of a new Latin law-dissertation which had just come into my hands, which he never could have seen and of which both subject and language were unknown to him. He read off

[mentally] many lines . . . [and] remembered his pages a long time."[3]

It appears, then, that learning in the sense of sheer memorizing is not necessarily equivalent to securing a worthwhile education. This conclusion is strengthened if we remind ourselves that the bulk of what we learn in school is forgotten within a relatively short time. If retentiveness were our sole test for the value of education, we should be obliged to conclude that a great deal of educational effort is a dead loss. On the other hand, if we believe in a substantive mind and in faculty psychology, it is possible to justify education, in spite of the fact that so much of what is learned is soon forgotten. Learning may serve an important purpose even if it is forgotten afterwards. The primary value of knowledge, from the point of view of education, is that it constitutes the material and evidence of exercise or training. Even though the particular items of fact fade from memory, they leave behind an effect which is permanent, and which is more valuable than a mere knowledge of facts. There is at least an element of truth in the saying that education is what you have left after you have forgotten all that you have learned.

What we call " education " is something different from the sum total of information that we are able to muster at any given moment. Perhaps an illustration will help to make this clear. It is well known that in athletic events a great deal depends upon the " form " of the athlete. If an athlete is in good form he will perform well; if he happens to be " off form " on a particular occasion he will do poorly. Form is a condition that is affected by a great

[3] James, W., *Psychology,* Vol. I, p. 660, note. Henry Holt & Company.

variety of influences. The athlete may be in poor form because he has been dissipating, or because he sat up late the night before, or because he neglected his training for several days, or for other reasons. A student may make a poor showing in an examination for much the same reasons. Base ball players, for example, seem to lose their proficiency very rapidly. After they quit the game they are no longer athletes except potentially — that is, they are not able to measure up immediately to a certain standard but could put themselves in a condition to do so in a short time if they cared to make the effort.

The preceding sentence indicates that such men do not revert completely to the condition in which they were originally. In various ways their physical structure and function has been permanently altered. There has been a permanent change, for example, in their respiratory system, in their circulatory system, in the development of their muscles, in the coördination between eye and hand, etc. They are never quite the same as they were before. This change is significant for two reasons. In the first place, it is easier for them to regain some of their old skill in the sport in which they were originally trained, and secondly, they find it easier to cultivate skills in new forms of sport. They have acquired a permanent aptitude for athletic performances in general; or at any rate they find themselves more proficient in certain other forms of sport in which they were never trained at all.

This analogy, according to the doctrine of a substantive mind, is applicable to the training of the mind as well as to the training of the body. A student may write a poor examination because he happens to have an "off" day, or because his memory has grown indistinct. But he can

relearn what he has forgotten more easily than he learned it the first time. Secondly, his training as a student helps him when he takes up a new subject. This is because his mind is being trained all the while. The things that we learn in school constitute, first of all, material for the exercise of the mind. When pupils are required to memorize, to reason, to exercise the imagination, to cultivate observation, to obey instructions and the like, this training leaves a permanent effect on the mind just as physical training leaves a permanent effect on the body. It is quite true that we may forget very rapidly the particular things that we have learned. There is, however, an effect of such training that abides. As has sometimes been said, the value of forgotten knowledge is very great.

It is true, of course, that the mind has no muscles or lungs which take into themselves the effects of the training, but it has an equivalent for these muscles in its faculties. The mind, like the body, acts in a variety of ways. We label these various kinds of activities with such names as perceiving, thinking, willing, remembering, imagining, etc. Each of these names designates a distinctive power or faculty of the mind. That is, the mind has a variety of faculties just as the body has a variety of muscles. These different powers can be trained in relative independence of one another, as in the case of the muscles of the body.

"By physical exercise the organs of the bodily frame are invigorated and developed, and by no other conceivable means. By the exercise of its several faculties, likewise, does the mind reach its power to use them. No faculty can interchange with any other in this matter, though it sometimes seems to be thought so. The faculty of language is developed by speaking; of observation by observing; of imagination by imagining; and of reason by reason-

ing; if we exercise but one, we shall educate but one; if we over-exercise one, the excess does not blow over to the benefit of another. We may develop the observation and the imagination, while we leave the judgment weak; whilst no labor which we bestow on the exercise of the reason will ever teach the pupil how to observe." [4]

Perhaps this is an overstatement of the case. If the analogy of the body can be trusted, we are not entitled to say that the faculties operate in complete independence of one another. It has been found, for example, that if the muscles of the right arm are developed by exercise, the muscles of the left arm undergo some development as a result of the exercise, even though the exercise itself is confined to the right arm. Similarly it is quite possible, since the faculties all pertain to the same mind, that the exercise of a given faculty may have some influence on other faculties. The advocates of formal discipline are not in agreement among themselves on this point. As one of them points out, " Since the mind is a unit and the faculties are simply phases or manifestations of its activity, whatever strengthens one faculty indirectly strengthens all the others." [5]

This view of the relation of the faculties to one another, however, need not disturb the main bearing of the argument. If we wish to develop a faculty, the proper procedure is to exercise it directly. Such exercise makes a lasting difference in the faculty concerned. The things learned may indeed be forgotten, just as a football player may be unable after a time to execute a particular play in which he has been trained, but the effect of the training

[4] Currie, James, *Common School Education,* p. 6. Clarke & Company.

[5] Roark, R. N., *Methods in Education,* p. 27. The American Book Company. Quoted by Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 269. Teachers College.

is built into the texture of the faculties so as to make them permanently different.

According to this theory, the chief benefit of training lies in the development of power and not in the training of specific abilities. Moreover, this development of power can be secured with a variety of materials. A muscle can be developed in various ways, and so can a faculty. It does not matter so much what we exercise our faculties on; the important thing is to exercise them. In fact it would not matter at all, except that some material serves the purpose of training better than others, just as some physical exercises develop the muscles more efficiently than others. Moreover, it is a fact that we do remember some things, even if the amount of what we remember is disappointingly small. Consequently, it is better to memorize useful facts than to exercise the memory on nonsense syllables. The choice of material, therefore, is not a matter of absolute indifference, but it seems fair to say that choice of material is of secondary importance.

This doctrine has become known as the doctrine of formal discipline. The meaning of the doctrine is indicated by the name. In the first place, the important thing in education is discipline or training. Secondly, the value of this training does not reside in the *content* of what is studied, but in the *form* — that is, in the fact that the faculties are being exercised. Given proper exercise, the faculties are developed or strengthened so that they can meet other situations more efficiently. A person who has exercised his memory on nonsense syllables will have a better memory for dealing with business affairs, a better memory for names and faces, a better memory for anything that calls for remembering.

This doctrine, then, gives an explanation of how education prepares for life outside of the school. Formal discipline is frequently identified with transfer of training. In the interests of clearness, however, it is worth while to point out in passing that transfer may be explained in more than one way. From the standpoint of formal discipline transfer of training means that training in a subject like Latin will help in some other quite unrelated field, such as physics or banking. The transfer is achieved, not through the application to the new subject matter of anything that is learned in Latin, but through the increase in power that has been gained. It is antecedently possible, however, to account for transfer of training in a different way. The study of a given subject may make for greater efficiency in some other field through the adaptation of content or method and not through increase in the powers of the faculties. There appears to be no sufficient reason why this should not be called transfer of training too. In fact, a number of writers announce that they believe in transfer of training, although they reject the theory of formal discipline. According to this standpoint, transfer of training means the application of previous experience to new situations. It does not mean formal discipline, since formal discipline is simply one particular explanation of how transfer takes place. It seems more expedient at the present time to make this distinction. If we do so, the rejection of formal discipline simply opens the way for other theories to account for transfer of training.

The doctrine of formal discipline has an obvious bearing on the construction of curricula. If the choice of subject matter is relatively unimportant, then there is no sufficient justification for the great variety of subjects and differen-

tiation of courses which characterizes modern education. In fact all this expansion of the curriculum may easily interfere with the ends of education. Pupils remember a smattering of many things but they do not get the discipline or training which is the really important thing in education. Moreover, much of this new material is less well adapted to the purpose of providing training than the older subjects are. Mathematics, for example, is much better adapted for the purpose of training in thinking than subjects like stenography and typewriting or community civics. Education could be carried on more economically and more effectively by making the course of study consist of relatively few but well organized subjects. We should have a more effective curriculum if we selected subjects with reference primarily to their value for the development of the various faculties.

An approach from this angle to the problem of the construction of curricula would provide a subject like mathematics for training in reasoning, a subject like literature for training in appreciation, courses in some one of the sciences for training in observation, etc. A curriculum so organized would be relatively small in content and would be adapted to the needs of all pupils, in spite of the fact that it offered little or no opportunity for election. It does not follow at all that the things in which pupils are interested are things which they ought to study. The doctrine of interest has led us astray. Education has been made both expensive and futile because we do not appreciate properly the need of training the faculties and have gone wandering off after false gods.

In this connection it is of interest to see how formal discipline, when it came upon the scene as a formulated

doctrine, affected the curriculum. In the histories of education John Locke is usually presented as the father of formal discipline. Education at that time had, of course, long been a recognized activity, and had evolved a definite and fairly uniform curriculum. This curriculum was the expression or educational corollary of a certain type of social organization. Among the Greeks society consisted of freemen and slaves. Then came a social organization symbolized by the lord of the manor and the serf. In time serfdom too passed away; but throughout and subsequent to these changes there persisted the distinction between those who toiled and those who were born to authority and leisure. Society was fixed or stratified, in the sense that social position and opportunity was determined antecedently by birth. As a rule every person remained on the general level on which he was born. Corresponding to the social distinction between the privileged and the unprivileged, there was developed the contrast between education for culture and education for vocation. For the great mass of people formal education came to consist largely of the three R's, the "tool" subjects, whereas for the privileged few education was represented by the classical curriculum. The latter was not supposed to have vocational utility, but was intended to initiate the individual into the cultural heritage of the race, to give him the refinement of taste and manners that were the hallmark of the gentleman. In brief, the educational scheme was of such a kind as to intensify and perpetuate social distinctions.

It might have been expected, perhaps, that when formal discipline became an accepted belief it would have the effect of weakening the influence of the classical curricu-

lum. If the important thing in education is the exercise of the faculties, there would seem to be no particular occasion for limiting the selection of subject matter to the old curriculum. But tradition was too strong, and formal discipline became an ally of classical education. It seems likely that the influence of the classics in education was much prolonged as a result of this alliance. At any rate, one of the stock arguments for a classical education was that it furnishes the best possible material for the training of the mind. The difficulty of mastering a dead language was supposed to constitute an advantage, since it offered a splendid opportunity for the exercise of the faculties. Moreover, it was generally conceded that the classics were the product of the best minds of the race. For the most perfect models, not only of thinking, but of artistic and literary excellence, it was necessary to go to the masterpieces of antiquity. Consequently the classics were entitled to the first place in the curriculum, both because they furnished the best material for the exercise of the faculties and because they possessed the unrivalled merit of presenting the best models as patterns for the growing mind.[6]

In its actual result, therefore, the doctrine of formal discipline became a means of confining education to a fixed and predetermined standard. For a long time the sciences and the social changes growing out of them found no recognition in the curriculum. As far as education could bring it about, the conception of what constitutes a good life remained the same, and educational values were pre-

[6] *Cf. The Value of the Classics,* especially the papers by A. F. West and N. M. Butler. Princeton Press. Also Matthew Arnold, essay on *Literature and Science.* According to Arnold, there are certain "powers," to be trained more or less separately.

dominantly of a literary sort. The business of education, apart from teaching the utilities, as represented by the three R's, was to mould pupils to a standard pattern.

In justice to formal discipline, however, it must be emphasized that its case does not necessarily stand and fall with that of the classics. Perhaps the alliance was a mistake. In any case, the doctrine warrants the inferences that a comparatively simple curriculum will serve all the essential purposes of education, and that, with regard to method of teaching, there is justification for giving scant attention to individual differences, since all minds are fundamentally alike. The faculty of reasoning or memory, for example, is absolutely the same in everybody. A faculty may differ considerably in strength in different individuals, but the essential nature of the faculty is the same everywhere. Consequently, the same treatment applies to all. The teacher must indeed gauge the difficulty of the work to the capacity of the student, but this is about all that he need to know concerning educational method.

Modern education emphasizes the doctrine of interest. From the point of view of formal discipline interest is a matter of secondary importance. It may be granted indeed that interest is a desirable thing. A pupil who takes an interest in his study works more steadily and efficiently, but interest is far from being an indispensable condition. A boy may acquire excellent physical development through a regime of training, whether he happens to like the training or not. If a boy is compelled to do hard work, his muscles and other bodily organs are undergoing development, regardless of how he feels about the work. Similarly a boy who takes a course in mental development will have his faculties strengthened whether the work interests him or not. The important thing is to see that the work is

done. The big stick may be a very effective substitute for interest.

It does not follow from this that there is no place in education for specific purposes. A boy may be trained for a vocational life just as he may be trained for specific physical activities, such as swimming or jumping. But the center of gravity in education, if education is to be liberalizing, must be located in general training and not in specific training. If this is true, it would appear that most of our present-day educational activities are misdirected. We make much of individual differences, and we are strongly insistent on specific objectives in education. There is a strong drift in the direction of specific education rather than general education. All this is away from the doctrine of formal discipline. This doctrine is a challenge to modern education and puts it on the defensive. Unless we can prove that there is something seriously wrong with the doctrine of a substantive mind and with its offspring, formal discipline, we seem obliged to conclude that most of our modern education is misconceived and a waste of effort.

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CHAPTER IV

THE REACTION AGAINST FORMAL DISCIPLINE

For many generations the doctrine of formal discipline was the dominant educational philosophy of the Occidental world. Occasional protests were heard, to be sure, notably from the camp of the Herbartians, but these protests did not succeed in making a very strong impression. With the beginning of the present century, however, there came a sharp reaction. It became more or less the fashion to decry formal discipline and to insist upon the need of specific objectives in education. A very different attitude and temper of mind began to assert itself.

In education, as in government, revolutions are a long time in the making. When habits of thinking and of practice prevail for a long time, they become exceedingly difficult to change. A great deal of pressure must accumulate before it becomes possible to break through the crust of inertia; and when the change does come its results are often less significant than the surface facts would seem to indicate. The French Revolution, for example, was a tremendous explosion. An observer might easily have supposed that the French people were done forever with the idea of monarchy; yet within a few years the monarchy was reëstablished under Napoleon. The Revolution did not change the mental habits of the people overnight, just as a New Year's pledge does not automatically change the habits of the person who signs the pledge. In a similar

way the steadily accumulating dissatisfaction with formal discipline has finally resulted in open revolt. We take great pains to familiarize our prospective teachers with the notion that formal discipline is an outworn creed. But the hangover of the past is still with us. The idea that the pupil has a " mind " which can be " trained " is not easily dispelled, because it is bred in the bone by our whole past civilization. It is not easy to effect the reorganization in our outlook and beliefs which is necessary to make a significant change. Such a reorganization can be promoted by a review of the main reasons why the older point of view is being abandoned in educational theory and practice.

As was pointed out in the preceding chapter,[1] the advocates of faculty psychology are not in agreement among themselves regarding the relation of the faculties to one another. One view declares this relation so intimate that the development of one faculty improves all the others. The other view regards the faculties as independent of one another, at least for practical purposes. The exercise of a faculty on any given material, according to this latter point of view, strengthens this particular faculty when it deals with other material, but has no significant effect on any other faculty. For example, memorizing the names in a city directory will strengthen the faculty of memory so as to make it more effective in remembering the incidents of a picnic party or the speeches at a banquet, but will not strengthen the powers of observation and reasoning. This latter view seems to be the more common. At any rate, the issue of formal discipline has been made to center mainly on the question whether it is possible to

[1] See pp. 33, 34.

strengthen a faculty by exercise so that this same faculty will be stronger when it is applied to different subject matter.

For present purposes it does not matter which of these two views is adopted. In either case the doctrine of formal discipline is the doctrine that training in a given field or subject matter such as Latin, grammar, or mathematics will give increased power in an unrelated field like history or literature. Whether or to what extent there will be an increase in power is a matter of uncertainty and dispute. As Thorndike states the case,

> "The problem of how far the particular responses made day by day by pupils improve their mental powers in general is called the problem of disciplinary value or disciplinary effect of studies or more briefly the problem of formal discipline. How far for instance does learning to be accurate with numbers make one more accurate in keeping his accounts, in weighing, measuring, in telling anecdotes, in judging the character of his friends? How far does learning to reason out rather than guess at or learning by heart a problem in geometry make one more thoughtful and logical in following political arguments, in choosing a religious creed, or deciding whether it is best for him to get married? How far does the habit of obedience to a teacher in school generate the habit of obedience to parents, laws and the voice of conscience?" [2]

As was intimated a moment ago, formal discipline was so firmly entrenched in our educational theory and practice that a great deal of dissatisfaction had to be engendered before it was openly attacked. Occasionally a voice was raised against it, but that was all. When the day of reckoning finally came, however, the doctrine of formal discipline was found to be in a sad state. The argument

[2] Thorndike, E. L., *Principles of Teaching*, p. 235. A. G. Seiler.

against it may be conveniently arranged under three heads. These are: first, the evidence from observation and experiment; secondly, the argument from the facts of physiology; and thirdly, the argument from theory.

With regard to the evidence from observation and experiment, it may be said that when a person once begins to entertain doubts about formal discipline, he is not likely to have much trouble in finding facts which give support to these doubts. One form of evidence, for example, against formal discipline may be found in the "sucker lists" which swindling stock promoters are said to use in their business. These "sucker lists," so we are told, are made up of the names of people who are "easy marks" for promoters of worthless stock, because in business matters they have the gullibility of children. It is said that the names of teachers and physicians rank highest on these lists; in other words, a smooth-spoken salesman can sell them anything, from a hole in the ground to a rubber plantation in Timbuctoo. That is to say, teachers and physicians, in spite of their intellectual training, do not have good judgment in buying stocks, which is the direct opposite of what we are led to expect by the theory of formal discipline.

To take another illustration, it is said of a gambler who played with marked cards that the marks by which he recognized particular cards were so faint as to be almost undiscernible to others, even when these marks were pointed out to them. The man had wonderful eyesight and was highly trained in this particular form of observation. Yet it was found that this same man had failed completely to notice that there were several species of sparrows under the eaves of the roof of the house in which

he lived. He was a living illustration of the fact that observation in one field does not necessarily transfer to another.

Such examples seem fairly numerous. The sailor whose power of observation has been trained so as to detect signs of weather that are not noticeable to other people is not necessarily able to report minutely on the fashions in the gowns worn by women at a reception. When Napoleon appointed the famous mathematician, La Place, as his minister of finance, he soon found out that intellectual ability in one field does not necessarily guarantee intellectual ability in another field. La Place, we are told, held the position only twelve months; then Napoleon dismissed him with the contemptuous remark that La Place was capable only of solving problems dealing with the infinitely little.

Observations of this sort are suggestive, but they are too random and uncontrolled to be conclusive. Serious experimental work was a long time in getting under way. Among the pioneers was William James, who made experiments in memorizing for the purpose of determining whether exercise has the effect of strengthening memory. One of these experiments is reported as follows:

"During eight successive days I learned 158 lines of Victor Hugo's 'Satyr.' The total number of minutes required for this was 131 5/6 — it should be said that I had learned nothing by heart for many years. I then, working for twenty-odd minutes daily, learned the entire first book of "Paradise Lost," occupying 38 days in the process. After this training I went back to Victor Hugo's poem, and found that 158 additional lines (divided exactly as on the former occasion) took me 151 1/2 minutes. In other words, I committed my Victor Hugo to memory before the training at the rate of a line in 50 seconds, after the training at the rate of a line in 57

seconds, just the opposite result from that which the popular view would lead one to expect."[3]

The experiment was not convincing, because James himself tells us that during the second attempt he was suffering from fatigue due to overwork, a fact which, as Colvin says, "invalidates the whole experiment." James's conclusion, however, that our native retentiveness is unchangeable and that improvements in memorizing are due to improvements in methods of memorizing, was significant in that it raised doubts regarding formal discipline and pointed to a different approach to the problem of transfer of training.

The attack on the problem that really started the revolution was made by the investigations of Messrs. Thorndike and Woodworth in 1901. These investigations were more carefully controlled than James's experiment in memorizing, and in their effects they were like a bombshell dropped into the camp of orthodox complacency. It was shown that the old theory of faculty psychology had mistaken names for things. For example, a person may be quick to detect misspelled words; and if we are lazy or blinded by preconceptions we are tempted to explain this trait by saying that such a person has a faculty of "quickness." But such quickness, it was found, did not guarantee quickness in other respects, such as arithmetical processes. It does not follow that because we apply the word "quickness" to both operations, they are therefore the same thing and due to a faculty of quickness. We might as well say that the rattle of a fender in an automobile is identical with every other rattle in the car, and

[3] James, W., *Psychology*, Volume I, p. 667, note. Henry Holt & Co.

that an old car makes so much noise because by virtue of exercise it has acquired a highly developed faculty of rattling.

It is sufficient for present purposes merely to indicate the results of these early experiments. In these experiments the persons acting as subjects were trained in such operations as judging the areas of paper cards, judging weights, and striking out certain letters, such as *e* and *s*, wherever they were found on a printed page. After a certain period of such training had been undergone and the amount of improvement had been recorded, the subjects were set to work on different but related tasks in order to determine the effect of the previous training. For example, after the subject had acquired greater facility in striking out the letters *e* and *s*, he was required to strike out certain other letters, such as *a* and *n*. On the basis of faculty psychology one would expect that the improvement acquired by practice on *e* and *s* would carry over practically undiminished to an operation so similar as the striking out the *a* and *n*. But this expectation is not borne out by the facts.

"Training in perceiving words containing *e* and *s* gave a certain amount of improvement in speed and accuracy in that special ability. In the ability to perceive words containing *i* and *t*, *s* and *p*, *c* and *a*, *e* and *r*, *a* and *n*, *l* and *o*, misspelled words and A's, there was an improvement in speed of only 39 per cent as much as in the ability specially trained, and in accuracy of only 25 per cent as much. Training in perceiving English verbs gave a reduction in time of nearly 21 per cent and in omissions of 70 per cent. The ability to perceive other parts of speech showed a reduction in time of 3 per cent, but an increase of omissions of over 100 per cent."[4]

[4] Thorndike, E. L., *Educational Psychology*, p. 90. Quoted by Bagley, W. C., *The Educative Process*, p. 206.

Results of this kind look bad for faculty psychology and formal discipline. If there is so much falling off of transfer in training when the shift is so slight, there is clearly no warrant for the assumption that training in a subject like mathematics is good preparation for reasoning in an unrelated field, like politics or real estate. The "spread" of improvement due to training is altogether too narrow to fit in with the traditional notion of formal discipline.

The work of other investigators corroborates this view.

"It seems probable that certain functions which are of importance in school work, such as quickness in arithmetic, accuracy in spelling, attention to forms, etc., are highly specialized and not secondary results of some general function. That just as there is no such thing as general memory, so there is no such thing as general quickness or accuracy or observation . . . Accuracy in spelling is independent of accuracy in multiplication, and quickness in arithmetic is not found with quickness in marking misspelled words; ability to pick out the word 'boy' on a printed page is no guarantee that the child will be able to pick out a geometrical form with as great ease and accuracy." [5]

An experiment by Bagley and Squire to test the value of training in neatness and accuracy in terms of transfer has been frequently cited and is of considerable interest for our discussion. The pupils in a third grade were told, in connection with their arithmetic work, that the papers must be written with neatness and accuracy, but no mention was made of these qualities in their other school work. After three weeks of drill in the preparation of neat and accurate papers in arithmetic a noticeable improvement was observed. In the language and spelling,

[5] Norsworthy, N., *Formal Training,* New York Teachers' Monographs, 1902, Vol. IV, pp. 96–99. Quoted by Bagley, W. C., *The Educative Process,* p. 207.

however, there was not only no gain in neatness and accuracy, but an actual decrease. The decrease in accuracy was almost as great as the increase that had been gained in arithmetic; and in neatness it was nearly half as great. This result proved so disconcerting to the investigators that "in view of the marked deterioration, it was thought best to stop the test." [6]

A second line of attack on faculty psychology and formal discipline grew out of the development of "physiological psychology." The older psychology, which based itself on the conception of a substantive mind, did not concern itself greatly with physiology. But whatever view we may take regarding the nature of the mind, it is an undoubted fact that our mental life is conditioned by the body.

> "If the brain be injured, consciousness is abolished or altered, even though every other organ in the body be ready to play its normal part. A blow on the head, a sudden subtraction of blood, the pressure of an apoplectic hemorrhage, may have the first effect; whilst a very few ounces of alcohol or grains of opium or hasheesh, or a whiff of chloroform or nitrous oxide gas, are sure to have the second. The delirium of fever, the altered self of insanity, are all due to foreign matters circulating through the brain, or to pathological changes in that organ's substance. The fact that the brain is the one immediate bodily condition of the mental operations is indeed so universally admitted nowadays that I need spend no more time in illustrating it." [7]

This recognition of the dependence of the mind upon the body resulted, about a century ago, in the develop-

[6] Bagley, W. C., *Educational Values,* p. 189. The Macmillan Company. The literature on experiments in transfer of training has grown to extensive proportions. The results are so conflicting as to prove only that something is wrong somewhere.

[7] James, W., *Psychology,* Vol. I, p. 4. Henry Holt & Co.

ment of phrenology. The doctrine of phrenology is of interest here because it represents a combination of faculty psychology and physiology. There is considerable evidence to show that the different areas of the brain represent different functions. Hence physiologists speak of the visual area, the auditory area, the motor area, and the like, and the whole topic is referred to as the localization of function. The suggestion advanced by the phrenologists was that the different faculties of the mind had their " seat " in certain specific parts of the brain, and that if a given trait or faculty was highly developed, this fact would show itself in the prominences or the " bumps " of the skull. Consequently, it was possible to know a great deal about an individual's mental characteristics by the simple process of examining his head.

In order to make this scheme work, the whole set of faculties was largely made over. Instead of determining the faculties of the mind by such abstract qualities as reasoning, imagining, perceiving, etc., the phrenologists studied individuals for the purpose of noting outstanding traits of behavior, such as amativeness, pugnacity, conscientiousness, and the like. These traits were classed as faculties, and the attempt was made to correlate them with the configurations of the skull. Thus according to Gall's system of phrenology, " the brain is supposed to contain more than thirty separate and individual organs which are the seat of the most complex psychic capacities, or internal senses, such as combativeness, the fear-of-God, a sense-of-fact, the impulse-of-self-preservation, philoprogenitiveness, and the sense-of-language." [8]

[8] Colvin, S. S., *The Learning Process*, p. 211. The Macmillan Company.

In the end, however, the development of physiological psychology proved inimical to phrenology and to faculty psychology in general. In the first place, it is evident that the exercise of a faculty, such as memory, will not avail a great deal unless the exercise at the same time improves the functioning of the brain. As James says, some brains, "like a jelly, vibrate to every touch, but under usual conditions retain no permanent mark."[9] Persons laboring under such a handicap may devise a scheme for fixing particular facts in the memory, but it is difficult to see how the power of memory in general can be improved. The retentiveness of the brain is a physiological property, and it is probably true that our native retentiveness is an unchangeable thing.

Physiological psychology, then, warrants a doubt of the efficacy of sheer exercise for the strengthening of a faculty. More than that, however, it calls into question the very existence of the faculties. For example, there is no such thing as a center for memory. On the contrary, the facts indicate that the various acts of remembering involve all sorts of "centers." At one time the memory has to do with color, at another time with sound, or again with taste, or smell, or shape, or form, in endless diversity. If we choose to talk in terms of centers, we seem compelled to infer that specific acts of remembering are processes which combine a variety of centers and that these centers differ according to the nature of remembering. In other words, remembering has to do not with an existential but with a *functional* unity. In a particular case of remembering, a variety of things, such as colors, sounds, places, emo-

[9] James, W., *Principles of Psychology,* Vol. I, p. 660. Henry Holt & Company.

tional qualities, etc., are brought together to constitute the total picture, and the physiological correlates of these constituents are not concentrated in one area of the brain, but involve the whole brain in a particular way. Consequently it is a waste of time to examine the skull for bumps in order to determine the presence of memory.

From the point of view of physiology, then, acts of memory are only an instance of adaptive behavior, which means that a variety of constituent acts are unified in accordance with the needs of the moment. Each thing remembered has its own distinctive physiological basis. We have no memory, but only memories. An act of memory is in principle like any other act of adaptive behavior, in which the eye and the hand and the foot are coordinated in accordance with the exigencies of the situation. To explain remembering by reference to a faculty of memory is like explaining the acts of an automobile mechanic by saying that they are due to a faculty of "construction." Such explanation is objectionable, because it mistakes naming for explanation. Not only so, but it withdraws attention from the fact that the total act, being adaptive, is both a complex and a shifting unity in accordance with the character of the situation in which it occurs. We never remember twice in exactly the same way.

The foregoing considerations may be summed up by saying that the weight of the evidence is all against the formal discipline of tradition. The experimental evidence is against the idea that the "powers" of the mind can be trained like muscles, so that the strengthening of these powers will automatically insure a high degree of efficiency in new and unrelated material. The facts of physiology indicate that acts like perceiving, remembering,

willing, reasoning, etc., are only responses in which the whole nervous system is directed towards a particular situation, with such shiftings and permutations as the circumstances of the moment may require. The case against faculty psychology and formal discipline is strengthened still further when we examine the theoretical considerations that are involved. The theoretical argument, which will be presented in the next chapter, shows that the old conception of mind, while historically inevitable, has become wholly untenable, and that it is necessary to move on to a new conception in order to explain the facts of mental life and to secure a working principle for the guidance of educational practice.

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CHAPTER V

THE THEORETICAL INADEQUACY OF THE "MIND" THEORY

As was shown in a preceding chapter, the conception of a substantive mind was a natural, and in fact a seemingly inevitable development from the experience of primitive man. Since man in his earlier history knew practically nothing of the relations that bind things together, he was compelled to treat each particular thing as a separate and independently acting entity. In proportion as he discovered relations among material objects, he developed the idea of "dead" matter, which is acted upon by outside agencies on the principle of push and pull. But he knew himself to be a spontaneously acting and purposive being. This spontaneity and purposiveness he quite naturally converted into an entity, since he was unable to explain it in terms of the relation between the physical organism and the surrounding environment.

This mind or self, so it is claimed, is made known to us in immediate experience. Every normal person is supposed to have a first-hand awareness of his own existence or selfhood. To the average person who has not made a study of the subject, this view is likely to seem entirely reasonable. He is easily persuaded that he has direct and incontrovertible evidence of his own existence. It may be, however, that the evidence is not so compelling if he can be induced to distinguish carefully between the

existence of his body and the existence of a mind or self. The body exists of a certainty; only a highly sophisticated metaphysician would have any doubts on that score. Perhaps the existence of a mind is equally clear, if by mind we mean the collection of aches and pains, fears, desires, volitions, perceptions, dreams, and all the rest, which James labels collectively the "stream of thought." But the mind or self with which we are concerned just now is not merely a stream. It is something else. It has permanence, it is a source of energy, it exercises choice, it is indivisible, and so on. If we bear in mind that this is what we are looking for, can we say with confidence that its presence is given with the same directness and assurance as a toothache?

When the question is put in some such form as this, we are apt to feel less sure of our ground. Many observers have reported on the subject, and their reports are generally not very encouraging. Indeed, the "mind" or "self," in the sense in which we are discussing it now, gets surprisingly little recognition in modern psychology. The prevailing view appears to be in substantial accord with what was said by David Hume long ago when he wrote:

"For my part, when I enter most intimately into what I call myself, I always stumble on some particular perception or other, of heat or cold, light or shade, love or hatred, pain or pleasure. I never can catch myself at any time without a perception, and never can observe any thing but the perception. When my perceptions are removed for any time, as by sound sleep; so long am I insensible of myself, and may truly be said not to exist. And were all my perceptions remov'd by death, and cou'd I neither think, nor feel, nor see, nor love, nor hate after the dissolution of my body, I shou'd be entirely annihilated, nor do I conceive what is farther requisite to make me a perfect non-entity. If any one

upon serious and unprejudic'd reflexion, thinks he has a different notion of himself, I must confess I can reason no longer with him. All I can allow him is, that he may be in the right as well as I, and that we are essentially different in this particular. He may, perhaps, perceive something simple and continu'd, which he calls himself; tho' I am certain there is no such principle in me."[1]

Hume's view of the matter appears to be sound. But if we join in the denial that the mind or self, as distinguished from the momentary experience, is ever an object of direct observation, it follows that the only remaining basis for the belief in a substantive mind is that a mind is needed in order to explain our experiences. It may be argued that there is more "to" a person than is revealed at any given time in his consciousness. In order to explain our transitory, evanescent experiences we must assume something which is radically different from them and which is abiding and essentially unchanging. Although the mind is never an experienced object, it is nevertheless something in the existence of which we are compelled to believe. The gist of the arguments previously set forth is essentially that the facts of experience cannot be understood except in terms of a substantive mind. The mind may be inaccessible to direct experience, but it does not therefore forfeit its title to a place in the world of fact.

If the doctrine of a substantive mind had only philosophical or theological bearing, practical-minded people might leave the question to persons who interest themselves in such matters. But the question of a substantive mind has important educational implications, and this fact takes it out of the realm of purely academic specu-

[1] Hume, D., *Treatise on Human Nature,* p. 252. Selby-Bigge edition.

lation. During recent times there has been much discussion of faculty psychology and formal discipline. The conclusions reached have usually been adverse to these ancient beliefs. These beliefs, however, are too deep-seated to be changed very easily. When prospective teachers study educational psychology, they frequently fail to discover that what they learn is not in accord with the belief in a substantive mind which they have acquired as a part of their racial heritage. Consequently they do not really surrender their faith in faculty psychology and formal discipline, however fluently they may recite the reasons why these doctrines are no longer acceptable.

It is now time for a critical review of the reasons for the belief in a substantive mind which have been stated in a previous chapter. These reasons have a certain measure of plausibility, yet, when examined more carefully, they appear curiously weak and inconclusive. Such an examination will make it easier to understand why it is that modern psychology has with virtual unanimity abandoned the doctrine of a substantive mind.

Identity. According to the theory under discussion, the fact of identity necessitates the inference to a substantive mind. This mind seems to offer a convenient and satisfying explanation of identity. As the argument proceeds, however, it becomes apparent that a certain assumption is involved. Animals and plants likewise have a certain identity. A family may keep the same dog for a number of years; and for many decades a certain tree near Boston was pointed out to sightseers as the very tree under which Washington took command of the Continental army. Yet we do not attribute a substantive mind to trees, whatever may be our view regarding dogs. It is

evident, therefore, that if a substantive mind is necessary for identity, the term identity does not have quite the same meaning when applied to inanimate objects that it has in the case of human beings.

The difference in meaning was pointed out in an earlier connection. The real meaning of identity, so it is argued, is that of an "unchanging essence," whereas the other meanings are of a secondary, derived sort. We first get the idea of identity from the changeless reality of the mind and then extend this idea to other things on the basis of more or less superficial resemblances.[2]

If this is the real basis of the argument, however, its plausibility diminishes rapidly. Is it true that the idea of identity necessarily presupposes an "unchanging essence" from which it is derived? When we deal with a question of identity in everyday life we are not even remotely concerned with any unchanging essence. Our concern is with the question whether a thing has sameness from a certain point of view or with regard to a given purpose. For example, if a person goes insane, is he still the "same person"? The answer is that it all depends on the purpose for which the question is raised. With regard to responsibility for previous acts, the law holds that he is no longer the same person. He cannot be held responsible for anything that he may have done previously. For certain other purposes, however, he is still the same person. He can still inherit property from his parents, at least in the sense that his share in the estate of his parents is set aside and held in trust. In matters of this kind the question of identity may very well arise. In the one case the court may appoint alienists in order

2 (*Cf.* Chapter III, p. 28.)

to determine whether he is the "same person" as the one who committed an offense against the law. In the other case birth certificates and the testimony of witnesses may be brought into court in order to prove that the person under examination is the son of the man whose estate is to be divided. The inquiry in the two cases runs along wholly different lines. When the question of identity is raised in law, the court is not concerned with a metaphysical question but with a purely practical question.

How the question of identity is determined by the point of view may be illustrated in a less solemn way by another reference to the Irishman's knife. According to the possessor, it is still the same knife in spite of the fact that it has acquired a new handle and new blades. But what shall we say to the ingenious suggestion that somebody might find the old handle and the old blades and fit them together, and that the finder, therefore, and not our original Irishman, is the possessor of the "same" knife? If we determine identity on the basis of the sameness of the constituent parts, then obviously the claim must be allowed. But in that case a tree is no longer the same tree if it continues to grow. On the other hand, if we determine identity by continuity of function and possession, then it is equally obvious that the rehabilitated knife is the one in which the identity resides. The one identity is no more "real" than the other. It is all a matter of definition.

The argument that identity presupposes an unchanging essence, it may be added, inevitably lands in a dilemma. If the idea of identity has such a source, it is apparent that such an unchanging reality cannot be used to explain anything. A thing which is ever the same obviously

accounts for nothing at all. On the other hand, if the notion of identity can be derived from everyday experiences, then it is not evident why it is necessary, so far as identity is concerned, to bother with a substantive mind.

Apart from reference to a purpose or point of view, there is not such a thing as identity. No object in all the universe remains quite the same throughout any two successive moments. For example, the weight of an object is constantly changing. According to physics, the weight of an object is determined by its relations to other objects. These relations, however, are constantly shifting; they are never quite the same. The movement of a planet in the skies affects the force of gravitation throughout the whole physical universe. Similarly the observed color of an object is conditioned by all sorts of factors, such as atmospheric conditions, the position of the sun, the condition of the observer's retina, etc. Here again we have reason to think that the conditions of a preceding moment are never quite repeated. Absolute identity or fixity is a dream of the metaphysician. In actual life identity has reference to some purpose or point of view.

We seem warranted, then, in concluding that the notion of a substantive mind is quite unnecessary to explain identity. A person is the same person to himself from day to day, not because he has a changeless substantive mind, but for quite different reasons. He has the "same" job today as yesterday; he is still the son of his parents and a member of his club; in brief, his present existence is bound up with all sorts of things in a way that involves what we call identity. When he pays his bill to the tailor or grocer, or when he collects his salary, or gets a birth certificate for himself in order to prove his nationality or

to get a passport for traveling abroad, he constantly deals in identities. He pays the bills because he is the person who incurred them; he collects his salary, or gets his birth certificate because he is the person that is concerned. But all this has nothing to do with the unchanging identity of a substantive mind.

Ownership. "Thoughts are owned." As James says, the "I" obtrudes itself constantly in our experience. Concerning the fact there is no dispute. The meaning of the fact, however, is quite another question. It is sufficient for present purposes to point out that the word "ownership" gives no insight into the relation that is supposed to exist between the momentary experience and the permanent "mind." The word ownership is familiar enough, but the ordinary meanings of the word do not seem to apply to the matter under discussion. If we say that a man owns a house or a suit of clothes, we have reference to a relation that is primarily legal in its nature. He can sell the house and he can have the suit made over to suit his taste — that is, he has certain special rights or privileges with regard to the objects of which he is the owner. But it is evident that this is not what we mean when we say that the mind owns its thoughts.

Sometimes, indeed, the word ownership is used in a different sense. One thing may belong to another in the sense of being physically attached to it. Thus we may say that the tail belongs to the dog, that the leaf belongs to the tree, or that the color or shape belongs to the house. The dog owns the tail, the tree owns the leaf, the house owns the color. In these cases the owner is the object to which the thing owned is attached and by which it is supported. But this meaning of the word ownership

is clearly quite inappropriate when applied to the relation between the mind and its thoughts. Thoughts are not physically attached to the mind as a postage stamp is attached to a letter, nor do thoughts "inhere" in the mind as a color inheres in an object. In other words, neither legal nor physical ownership sheds any light. We postulate a substantive mind in order to explain the facts of experience and then find that it does not explain anything. When we say that thoughts are owned we are not explaining a problem, but naming it. If this is the best we can do, why bring in a substantive mind at all? Instead of explaining things, the substantive mind is but useless baggage. It does not appear that the facts of experience, so far, offer any warrant for the inference to a substantive mind.

Activity and Freedom. To many persons the fact that we have an immediate sense of putting forth effort, of determining both the amount and direction of effort, is a strong argument for the existence of a substantive mind. It is not denied that we do have an immediate sense of activity and of freedom. The question at issue, however, is what inference may be drawn from this fact. Are we entitled to conclude that this sense of activity has its source in a substantive mind?

Such a conclusion can scarcely claim to be self-evident. Most psychologists would hold differently. This sense of activity or effort, so they maintain, has its origin, not in a substantive mind, but in the muscles of the body.

"When we look or listen," says James, "we accommodate our eyes and ears involuntarily, and turn our head and body as well; when we taste or smell we adjust the tongue, lips and respiration to the object; in feeling a surface we move the palpatory organ

in a suitable way; in all these acts, besides making involuntary muscular contractions of a positive sort, we inhibit others which might interfere with the result — we close the eyes in tasting, suspend the respiration in listening, etc. The result is a more or less massive organic feeling that attention is going on. This organic feeling comes . . . to be contrasted with that of the objects which it accompanies, and regarded as peculiarly ours, whilst the objects form the not-me. We treat it as a sense of our *own activity,* although it comes in to us from our organs after they are accommodated, just as the feeling of any object does. Any object, if *immediately* exciting, causes a reflex accommodation of the sense-organ, and this has two results — first, the object's increase in clearness; and second, the feeling of activity in question. Both are sensations of an 'afferent' sort." [3]

One important reason why these bodily feelings are mistaken for a direct apprehension of a substantive mind or self is that many of our reactions are so subtle and complex that they commonly pass unnoticed. Hence they give an impression that there is a pure spiritual activity over and above the grosser bodily activities. This feeling of the self, to quote again from James, "when carefully examined is found to consist mainly of the collection of these peculiar motions in the head or between the head and throat . . . our entire feeling of spiritual activity, or what commonly passes by that name, is really a feeling of bodily activities whose exact nature is by most men overlooked." [4] Testimony of this kind indicates that the alleged immediate awareness of a substantive self must be viewed with caution. It seems undeniable that bodily feelings constitute at least a part of what passes as the feeling of selfhood; and if so it is quite possible that they constitute the whole of it. Consequently the existence

[3] James, W., *Principles of Psychology,* Vol. I, p. 435.
[4] *Ibid.,* Vol. I, p. 301.

of this feeling is no longer an immediate warrant for the inference to a substantive mind.

Our conclusion, so far, is that the support given by the facts of experience to this inference is of a dubious nature. Further consideration of the matter inevitably raises the question whether the inference is worth making anyhow. Does it explain anything that we wish to understand? Since the reason for accepting the doctrine of a substantive mind lies in the assumption that it explains what would otherwise remain obscure, the doctrine in question must give us a better insight or we have gained nothing in the end. There is reason to suspect that, so far as insight or understanding is concerned, the acceptance of this doctrine leaves us no better off than we were before. Names do not constitute explanations.

In the background of our thinking there is usually a lingering idea that the belief in a substantive mind is bound up with the belief in free will. This idea, when examined, loses much of its plausibility. If we assume that human beings exercise freedom in some sense, it can hardly be said that the existence of a substantive mind sheds any light on the nature of this freedom. In moments of regret we are likely to feel that we could have acted differently. The mind could have made a different decision, it could have guided our actions to a different end. Perhaps so, but how does the mind reach the decisions which it actually makes? Is it guided by reasons suggested by the environment? If so, would not the environment suggest precisely the same reasons if any given situation were repeated? Or does the mind create its own reasons? In that case, this alleged freedom becomes not only an exceedingly dangerous, but a wholly mysteri-

ous and fearful thing. Suppose a man is haled into court for the offense of an unprovoked attack on an innocent policeman. In one sense the attack was an ideally free act. It was not prompted by any outside suggestion or provocation. Why then was the act committed at all? The only answer can be that the offender acted as he did because he saw fit to act that way. This is about as far as we can get. To answer the why is to adduce reasons, and then we seem to be on the road to showing how the act was determined and could not have been anything different. Yet if reasons do not count, free will becomes a synonym for irrationality. The substantive mind does not serve to explain anything, but to shunt off inquiry. A man acts as he does, on this basis of reasoning, because his mind so decided. This is not to explain but to give an official sanction to ignorance.

The purpose of this discussion is not in the least to take sides on the question of free will. The point is simply that the inference to a substantive mind has no clear warrant in the facts of activity and freedom, nor does it give us any insight into the nature of activity and freedom. As in the case of ownership, we merely substitute a name for an explanation. The "mind" which is supposed to explain turns out to be even more mysterious than the things to be explained.

Immortality. The argument here is confessedly hypothetical. If immortality is a fact, then the existence of a substantive mind would be a convenient way of explaining the fact. This conclusion may be admitted, provided that we bear in mind, first, that the continued existence of a substantive mind would not necessarily guarantee that this mind would continue to have consciousness after

death, and secondly, that there is considerable difficulty in conceiving the relation between such a mind and its experiences or "states." But even so, it does not follow that the assumption of a substantive mind would be the only condition on which an explanation is possible. The suggestion has been made, for example, that the basis of the connection between the present life and the life after death may be of a physical nature and need not necessarily involve a substantive mind at all.[5] It is true that the suggestion does not amount to more than a vague speculation, yet the fact that a different explanation of immortality is antecedently possible is sufficient to show that we must not be too ready to assume a necessary connection between the belief in immortality and the belief in a substantive mind.

"If the discreet naturalist were asked how he could conceive the survival of intelligence to be affected after the machinery by which it had apparently been engendered had disappeared, his answer might be somewhat as follows: He would first call attention to the fact that in the process of reproduction all the experience of the antecedent life is passed on from generation to generation over what we may term a molecular bridge. Thus, in the case of man, a tiny mass of protoplasm imponderably small, carries on from parents to child the body, the mind, all indeed that the predecessors in tens of thousands of specific forms and unimaginable millions of individuals have won of enduring profit from their experience. Therefore, even within the narrow limits of the known there is evidence that the seed from which an individual intelligence may be evolved can be effectively guarded and nurtured in the keeping of an exceedingly small body of matter. In a word, the facts of generation show that under certain conditions life as complicated potentially as that which passes away from the body at death may

[5] Schiller, F. C. S., *The Riddles of the Sphinx,* Chapter XI. The Macmillan Company.

reside and be cradled in states of matter which are, as compared with the mature body, very simple."[6]

Concept Formation. It is contended that certain concepts, such as "infinity" and "perfection," are evidence of a substantive mind, since such concepts could not be derived from experience. This contention may be seriously questioned. If we examine the idea of perfection, for example, we discover that this idea is relative in character. Relative perfection means that a given thing is perfect with reference to the purpose in hand. My watch may serve perfectly to get me home for dinner, although it would not serve the purpose of timing a foot race. An automobile may be perfect for the process of getting me to a certain place on time; a book may serve perfectly as a paper weight; a nail may serve perfectly as a substitute for a screw to hold a board in place. Experience furnishes us with endless illustrations of this kind and tends to show that there is ample material in everyday experience for the development of a concept such as a concept of perfection.

The concept of infinity is perhaps more obscure. But when we say that space, for example, is infinite, what do we mean? In practical terms we mean that we can take any given point in space and from this point move in any direction we may choose. This is true of all the points in space. This quality of space comes within our experience and it expresses essentially what is meant by spatial infinity. Similarly the number series is infinite in the sense that any given number, however great, can have another unit added to it. The concept of infinite as ap-

[6] Shaler, N. S., *The Individual,* p. 304. Appleton & Company.

plied to space, time, or number, does not mean an "infinite number" of units. The notion of "infinite number" is like the notion of round-square; it means "numberless number." The infinite here is rather a rule of procedure. It means simply that we can always add to any assigned number. Any object of experience which is of such a nature as to permit this is called an infinite. It does not appear at all necessary to introduce a substantive mind in order to explain such objects or facts.

Our survey, so far, leads to the conclusion that a substantive mind is not necessary to explain the facts of experience. But the case against the substantive mind can be made even stronger. As was said before, the substantive mind is an inference and not a fact of immediate experience. In making an inference of this kind we go beyond the facts of experience. This raises the question whether it is permissible to use the facts of experience in order to make an inference to something that lies beyond them.

In one sense such a use of facts is entirely permissible and, indeed, is quite common. For example, we make inferences regarding the center of the earth, or regarding the size and shape of molecules, although these are all facts that lie beyond the realm of experience. In making such inferences, however, we are still dealing with experiential material. No one has ever seen the center of the earth, but we are familiar enough with other kinds of centers and by analogy we can construct a picture of what the center of the earth is like. Similarly the inaccessibility of molecules is no bar to an imaginative reconstruction of them. It is only by accident, so to speak, that molecules and the center of the earth are inaccessible to us. Theo-

retically the molecules could be made accessible by improved instruments and the center of the earth could be reached by digging. In other words, when we deal with such objects we extend our present forms of experience by means of the imagination. Consequently, we do, after all, remain within the bounds of experience, in the sense that our thinking is in terms of experience and seeks to conform to the laws of experience.

There is, however, another sense in which we may attempt to go beyond experience which is in violation of the principles laid down by science. We cannot, for example, have any dealings with a fourth dimension of space, for the reason that the space of our experience is of three dimensions and we have no analogies by which we can form any comprehension of what a four-dimensional space might be like. We cannot go back to an absolute beginning of the universe, because all the beginnings of which we have any knowledge are beginnings within a universe which antedates them. Every beginning to which we can attach any meaning comes after something else. An absolute beginning is a meaningless term. An absolute end of space is likewise a meaningless term.

Let us now attempt to apply these considerations to the doctrine of a substantive mind. According to the theory, this mind never enters experience at all. There is a fixed and irremovable contrast between experiences and the mind to which the experiences "belong." It would appear, therefore, that the mind lies beyond the reach of experience in the objectionable sense of the term. It is not merely something which we never happen to experience directly; it is something which we cannot imagine or reconstruct on the basis of the materials furnished by ex-

perience. This is only a round-about way of saying that the mind is not only useless for purposes of explanation but is essentially unintelligible.

We can understand, therefore, why the modern psychologist has discarded the conception of a substantive mind. He has a deep-seated conviction that explanations in terms of such a mind are not explanations at all, but the surrender of explanation. The procedure in such "explanation" is to explain what we do know in terms of what we do not know, which is subversive of all scientific method. Instead of explanation, the doctrine of a substantive mind really furnishes nothing but names. It is like explaining opiates by saying that they have a soporific virtue, or like explaining stones by reference to the principle of "lapidity." While the belief in a substantive mind is still widespread, the subject in modern scientific psychology has become one chiefly of historical interest.

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CHAPTER VI

THE THEORY OF CONSCIOUSNESS OR MENTAL STATES

As was shown in the preceding chapters, the doctrine of a substantive mind, which operates through its faculties, is beset with numerous and serious difficulties. The passage of time has not served to minimize these difficulties. Psychologists everywhere have rejected the doctrine, not only because it is unverified and unverifiable, but because it is essentially unintelligible. The persistence of the doctrine in popular thinking, despite the fact that among psychologists it has been generally discarded, is perhaps not surprising when we consider the power of tradition and the tendency of the imagination to convert processes into entities. Yet a new and more adequate theory of mind has become a necessity.

Our present task is to indicate how a new conception of mind grew out of the older doctrine. Let us consider for a moment what is called "the problem of sense-perception." Visual perception is a convenient example. Common sense is usually quite unaware that there is any problem about it. In order to see we need only turn our eyes in the right direction and the mind thereupon "takes in" the object. It is all very simple.

This simplicity, however, soon disappears when we begin to study the matter. We may say, if we like, that the mind "takes in" objects, but this is merely a figure

of speech and nothing more. If a person looks at a distant hill, he does not take the hill literally into his mind. The hill stays where it was. Moreover, it is hardly less difficult to suppose that the mind somehow reaches across the miles of intervening space in order to lay its ghostly hands on the hill. We do not " take in " things in that way either. How, then, does the mind come into contact with the object or take possession of it?

The answer obviously must be that the mind comes into relation with the object through the sense-organs. First, we have light-waves, which travel from the object to the eye. Then certain processes take place in the retina, which set up a stimulation in the optic nerve. This stimulation eventually reaches the cerebral cortex, and it is only after all this has come about that seeing takes place.

When we consider all this intervening machinery, the simplicity and immediacy of visual perception seem to go by the board. It is certainly not simple, and there seems to be no room left for the notion that we apprehend or grasp objects directly. Seeing is more like receiving letters from a person in a foreign country. Messages come in through the sense-organs, and these messages give us a clue to the things outside. But even this comparison gives us no adequate conception of the separation between the mind and its object. Perhaps the radio will serve our purpose somewhat better as an illustration. What we hear is likely to have a certain amount of static mixed in with it. We sometimes say that the air is " full of static." This does not mean that the air is full of noise, as we can easily verify by going outside to listen. The noise of static, considered as noise, does not exist anywhere until it

is generated within the receiving instrument itself. The only stimulation that reaches the receiving mechanism is a certain vibration or undulation. Now our sense-organs, it appears, are essentially receiving instruments. They produce the qualities that we experience. The mind cannot go out and take hold of objects; it is tied to the receiving end of the mechanism. Consequently we have to recognize the possibility that the sense-qualities which we experience do not give us any sort of picture or photograph of what is outside. Perhaps these sense-qualities are like static, in that they have no existence until they are generated by the sense-organs.

Further consideration of the matter makes this suggestion appear highly probable. Certain objects appear to normal observers as red or green, but to a color-blind person they appear as gray. The stimulation is the same, but the results are different. Why not say, then, that all these colors are just so much static, the differences being due to differences in the mechanism of the sense-organs? What we shall experience is determined primarily, not by the nature of the stimulus, but by the nature of the sense-organ. No matter what sort of stimulus we apply to a sense-organ, the sense-quality is always of a certain kind; it is visual, or auditory, or olfactory, depending on the nature of the sense-organ.

"Whether we press the retina, or prick, cut, pinch, or galvanize the living optic nerve, the subject always feels flashes of light, since the ultimate result of our operations is to stimulate the cortex of his occipital region. Our habitual ways of feeling outer things thus depend on which convolutions happen to be connected with the particular end-organs which those things impress. We *see* the sunshine and the fire, simply because the only peripheral end-organ sus-

ceptible of taking up the ether-waves which these objects radiate excites those particular fibres which run to the centers of sight. If we could interchange the inward connections, we should feel the world in altogether new ways. If, for instance, we could splice the outer extremity of our optic nerves to our ears, and that of our auditory nerves to our eyes, we should hear the lightning and see the thunder, see the symphony and hear the conductor's movements. Such hypotheses as these form good training for neophytes in the idealistic philosophy!"[1]

What we call mind, then, includes, besides a permanent substance or entity, all sorts of passing modifications or "states." We see and hear and feel, and these experiences are perceptions or temporary states of the mind, in somewhat the same way that a wave is a passing state of the water in the lake. The sense-organs generate certain results in the mind, which we call sensations or perceptions. Those sensations or perceptions are not carried in from the outside — whatever that might mean — but they are produced within the mind itself. To put it differently, the sense-organs are not merely common carriers, like an express company, which simply receives and delivers the packages that are brought to it by its customers. The sense-organs give us a kind of service which we would not tolerate in the case of an express company. If an express company were to receive a package of books in one city and deliver a package of dress goods to the consignee in another city, with the claim that the two packages were identical, considerable work would be ahead for the trouble department. Of if the express company should claim the privilege of deciding, like a sort of Santa Claus, what kind of package the person at the other end of the route

[1] James, W., *Psychology* (Briefer Course), p. 12. Henry Holt & Company.

is to receive, the company would not remain in business very long. Yet it appears that our sense-organs exercise a privilege of just that sort. And since they have an absolute monopoly of the business, we have to put up with this kind of service, whether we like it or not.

As was suggested a moment ago, the term "mind" was made to undergo a tremendous extension of meaning. All the sights and sounds, the smells and tastes, which our common sense regards as objective facts, are really mental; they are "states" of the mind. The sense-organs are even more dictatorial and arbitrary than the war-time censorship of news, since the sense-organs not only decide which messages shall go through, but take it upon themselves to rewrite all the messages. Some of the reasons for this view have already been indicated. Since this doctrine is of very great theoretical and practical importance, both in education and outside of it, the main arguments for the doctrine will be briefly summarized, even at the risk of some repetition. These arguments may be conveniently classified under two heads.

The Argument from Relativity. This argument calls attention to the fact that we have no absolute standards for judging sense-qualities, and that these qualities vary according to their relation to the organs of perception. These facts indicate that sense-qualities, as we perceive them, are "subjective" and not "objective." For example, as we look at some object — say, a piece of chalk — we see a smooth surface. Both the eye and the hand report that the chalk is smooth. If we apply a microscope, however, the report is different. We then find that the surface of the chalk is not smooth at all but exceedingly rough, the degree of roughness depending upon the

strength of the microscope. The fact suggests a disparity between the report of the senses and the physical fact. We can imagine a microscopic bug crawling over the surface of the chalk, falling down the crevices and climbing up the slopes, and in general having an experience very much like that of the early pioneers who crossed the Rocky Mountains on their way to the Pacific Coast. From the point of view of the bug certainly, the chalk is anything but smooth. If, now, we ask how rough the surface of the chalk really is, it seems impossible to furnish an adequate answer. The smoothness or roughness which we actually experience is determined by such factors as the structure of the retina, the power of the microscope that is employed, etc. It seems impossible to set up any absolute standard, but only a human and practical standard.

The Physiological Argument. The second argument, which is called here for convenience the physiological argument, reaches the same conclusion by analyzing the process of sense-perception more in detail. To illustrate, let us assume an observer who is looking at an object on the horizon a mile or two away. According to the explanation given by physics and physiology, visual perception in such a case involves a considerable number of intermediary objects. In the first place, we assume ether-waves which travel from the object to the eye of the observer. When these ether-waves impinge upon the retina of the eye, a disturbance is set up in the optic nerve which is ultimately transmitted to the occipital lobes of the brain; it is then, and not till then, that seeing takes place. The object seen is at one end of the situation, and the observer is at the other. The situation is much like that

which occurs when a person is listening to something that is said to him over the telephone. The voice of the speaker is not transmitted literally over the wire; if it were, the voice could be heard at any point along the wire without the aid of a receiver. The apparatus of the telephone recreates the voice in the booth where the voice is heard.

The point of all this, as was said before, is that the sense-quality which is experienced is something created in the mind of the observer. If our hypothetical observer notices that the object on the horizon is a tree and that it has green foliage, we cannot forthwith assume that the color green is physically transmitted from the tree to his eye. The ether-waves do not transmit a physical color. If they did, the waves themselves would be green; in other words the entire field of vision between the observer and the tree would be green in color. What the ether-waves transmit is not a color but a certain stimulus which produces the perception of green. It seems necessary, therefore, to assume that the green color is created in the brain of the observer.

This conclusion inevitably raises the question whether we ever see things "as they are." The answer is that this question may mean either of two things. According to one of these meanings we see things correctly or "as they are," if our perception conforms to certain practical standards. Thus, if we say that the chalk is "really" two inches long, this perception is held to be correct if we can apply a measuring stick and find that our expectation is verified. By correctness of observation we mean, in this case, that our experiences fit together or corroborate one another. This can happen in all sorts of ways. If a per-

son sees the chalk as smooth and then finds that it feels smooth to the finger, he regards the first observation as correct, even though the microscope may tell a different story. Or he holds that he sees things correctly if other persons see them in the same way. Thus green is the "real" color of grass because all "normal" people see it as green.

There is, however, a second meaning to our question. According to this meaning we see things "as they are" only if our perception is a photographic reproduction of the objective fact. Our standard in this case is not how our perceptions fit together, but how closely our perception resembles the objective fact to which it is supposed to refer. Since we cannot jump out of our skins, so to speak, in order to see how our perceptions compare with things, it is impossible to determine whether our perceptions are ever "correct" in this sense or what difference it makes whether they have this kind of correctness or not. Yet many people have argued that perception reveals to us things "as they are," at least in some of their qualities. John Locke, for example, held that our perceptions of "primary qualities," *viz.*, solidity, extension, figure, and mobility, are normally correct, photographic representations of external fact.[2] He denies, however, that this is true of other qualities, which he calls "secondary qualities." As he says:

"Flame is denominated hot and light; snow, white and cold; and manna, white and sweet, from the ideas they produce in us; which qualities are commonly thought to be the same in those bodies that those ideas are in us, the perfect resemblance of the other, as

[2] Locke, John, *Essay on the Human Understanding,* Book II, Chapter 8, Sec. 9. Open Court Publishing Company.

they are in a mirror; and it would by most men be judged very extravagant if one should say otherwise. And yet he that will consider that the same fire that at one distance produces in us the sensation of warmth, does at a nearer approach produce in us the far different sensation of pain, ought to bethink himself what reason he has to say that this idea of warmth, which was produced in him by the fire, is actually in the fire; and his idea of pain, which the same fire produced in him the same way, is not in the fire. Why are whiteness and coldness in snow, and pain not, when it produces the one and the other idea in us; and can do neither, but by the bulk, figure, number, and motion of its solid parts?" [3]

It is not necessary for present purposes to discuss this point in detail. Our concern is with the conclusion that all sense-experiences are "in the mind"; they are a part of what we mean by mind, but they are not identical with the unexperienced entity which we have previously called mind, or with any of its faculties. As soon as this truth was understood, it became necessary to invent a new name for them, and they accordingly became known as mental states or consciousness. The sense-experience of "red" or "cold," for example, was regarded as a temporary state or condition of the substantive mind, or as the mind's *consciousness* of the sensuous quality. The terms "mental state" and "consciousness" become synonymous. It is insisted that mental states, or consciousness, are different from matter, but beyond this we cannot go very far. According to Stout, "properly speaking, definition is impossible. Everybody knows what consciousness is, because everybody is conscious." [4] He warns the reader, however, that the term consciousness is sometimes used in the sense of mere awareness, which is too

[3] Locke, John, *Essay on the Human Understanding*, Book II, Chapter 8, Sec. 16.

[4] Stout, G. F., *Manual of Psychology*, p. 7. Noble and Noble.

restricted a meaning. It is necessary, as he points out, "to state definitely that consciousness includes not only awareness of our own states, but these states themselves, whether we have cognizance of them or not. If a man is angry, that is a state of consciousness, even though he does not know that he is angry. If he does know that he is angry, that is another modification of consciousness, and not the same." [5]

We may now proceed to indicate how the whole conception of mind was transformed. At first this conception was merely widened so as to provide a place for "consciousness" or "mental states." John Locke, for example, retained the belief in a substantive mind and faculties, but he held that the mind passively receives impressions from without. The mind, in his view, is as "white paper" upon which the external world leaves an imprint or record, which is designated by such terms as "sensations," "impressions," or "mental states." The term habitually used by Locke himself is "ideas." It gradually became apparent, however, that the belief in a substantive mind and the belief in mental states have no necessary connection with each other. The former may be abandoned while the latter is retained. In that case the saying that the mental states are "in the mind" becomes purely metaphorical. The mental states are not "in the mind"; they *are* the mind; and we thus emerge with a radically different conception of what is meant by mind. All that is necessary to make the transition is to drop the notion that there is an entity called mind standing behind the scenes and to say that the aggregate or "stream" of mental states constitutes the mind. That

[5] *Ibid.*, p. 8.

is, the term "mind" is a collective name like "army" or "mob."

This momentous step was finally taken by Locke's great successor, David Hume. According to Hume — who is known to history as the great sceptic — the belief in a substantive mind is wholly without foundation. All belief, he asserted, must be based on experience, and experience consists of nothing but sense-impressions and more or less faint copies of impressions, which we call images. Consequently we are not entitled to draw any inferences concerning the existence of supposititious substances, since these substances are, by definition, wholly different from sense-experience. What we call the perception of a tree is just a cluster or bundle of impressions and images, which as a whole constitutes a mental state or our consciousness of a tree. We can undertake to study the laws or principles according to which these impressions and images combine, but it is neither necessary nor permissible to seek for explanations in terms of substances, whether of a mental or a physical kind. The general position taken by Hume is vigorously advocated among modern writers, with certain modifications, by Karl Pearson. The following quotation is a fair summary of his general point of view:

> "Turn the problem round and ponder it as we may, beyond the sense-impression, beyond the brain terminals of the sensory nerves we cannot get. Of what is beyond them, of 'things-in-themselves' as the metaphysicians term them, we can know but one characteristic, and this we can only describe as a capacity for producing sense-impressions, for sending messages along the sensory nerves to the brain. This is the sole scientific statement which can be made with regard to what lies beyond sense-impressions." [6]

[6] Pearson, Karl, *The Grammar of Science*, p. 67. A. & C. Black.

Pearson accordingly warns us that the laws formulated by science apply only to sense-impressions. A "law of nature" is to him simply "*a resumé*" in mental short-hand, "which replaces for us a lengthy description of the sequences among our sense-impressions."[7] Thus the statement that the earth goes around the sun is intended, not as a statement of fact, but as a substitute for the actual sequence of our sense-impressions. Since we cannot get beyond sense-impressions, we cannot say that the earth actually goes around the sun, nor do our sense-impressions go around one another. The formula is merely a convenient device intended for practical purpose and not for a description of supersensuous fact.

Since the time of Hume much effort has been expended in the analysis of mental states. According to Hume, mental states consist of "impressions" and their copies or images, and nothing else. Many psychologists have held that this analysis is inadequate, and that it is necessary to distinguish between *sensations*, on the one hand, and *feelings* on the other. By sensations is meant our elementary impressions of colors, sounds, and the like; by feelings is meant the qualities of pleasure and pain. Some have argued, further, that there is such a thing as "imageless thought"; *i.e.*, they hold to a mental element which is distinct from both sensations and feelings. But questions of this sort have no bearing on the proposition, which has met with general acceptance, that there is no need of a substantive mind to explain the facts of experience.

If we go back a distance of twenty-five years, or even less, we find that the psychology of consciousness or men-

[7] *Ibid.*, pp. 86, 87.

tal states was the prevailing type of psychology. The definitions of psychology given by writers of that earlier period differ in verbal form, but they all assume that their subject matter is the kind of reality designated by such terms as "consciousness" and "mental states." Thus Ladd states that psychology is the science that deals with "the phenomena of human consciousness."[8] According to James, psychology is the "description and explanation of states of consciousness as such."[9] Titchener, defines psychology as "the science of mental processes,"[10] which is substantially the definition given by Stout.[11] In an early book on psychology Dewey states that psychology is the science of the self, but it soon appears that the fundamental characteristic of the self is consciousness. Dewey agrees with Stout in the view that it is impossible to give a definition of consciousness. We can only say that it is a peculiar kind of existence which constitutes the whole of our experience, and that, since it constitutes all experience, there is nothing with which it may be compared or contrasted. "Consciousness can neither be defined nor described. We can define or describe anything only by the employment of consciousness. It is presupposed, accordingly, in all definitions; and all attempts to define it must move in a circle. It cannot be defined by discriminating it from the unconscious, for this either is not known at all, or else is known only as it exists

[8] Ladd, G. T., *Elements of Physiological Psychology,* p. 3. Charles Scribner's Sons.

[9] James, W., *Psychology* (Briefer Course), p. 1. Henry Holt & Company.

[10] Titchener, E. B., *Outline of Psychology,* p. 5. The Macmillan Company.

[11] Stout, G. F., *Analytic Psychology,* Vol. I, p. 1. The Macmillan Company.

for consciousness. Consciousness is necessary for the definition of what in itself is unconscious. Psychology, accordingly, can study only the various *forms* of consciousness, showing the *conditions* under which they arise."[12]

Although it is difficult to exaggerate the significance of the change which was introduced by this shift from a substantive mind to a "stream" of mental states, it is exceedingly important to note that in one fundamental respect there was no change at all. The belief in the existence of a kind of mental "substance" was still retained, the only difference being that this substance was no longer identified with a "mind" behind the scenes, but with the mental states as they come and go. It was still taken for granted that there is a mental *stuff*, so to speak, which is as different as possible from material stuff. All that had happened was that this mental reality was identified, not with a hypothetical and mysterious substantive mind, but with the lightly tripping mental states, or consciousness. It is difficult to define consciousness, not because it is so remote, but because it is so near at hand. Consciousness defies definition, not because we do not know it, but because we do not know anything else. To define is to mark off, and there is nothing with which consciousness can be contrasted. We cannot contrast consciousness with physical objects, for example,

[12] Dewey, J., *Psychology*, pp. 1, 2. American Book Company. To prevent misunderstanding, it should be stated that some of these writers, notably James and Dewey, have given up this conception of consciousness in later years. In his *Essays In Radical Empiricism*, Chapter I, entitled, *Does "Consciousness" Exist?*, James roundly repudiates his earlier belief. For Dewey's later view of consciousness see his *Influence of Darwin on Philosophy, and other Essays*, the chapter entitled, *"Consciousness" and Experience;* also *Creative Intelligence*, Chapter I.

because physical objects as we experience or know them are mental states through which or by means of which we come into relation with the world beyond. When we infer physical objects, we do not leave consciousness behind. As the poet says, "When me they fly, I am the wings." We can deal with physical reality only as we experience it, *i.e.*, only as it exists *for us*. We cannot escape from this limitation any more than a balloon can rise entirely beyond the atmosphere by which it is supported.

The psychology of "consciousness," then, did not necessarily involve a repudiation of what is known in philosophy as dualism, *viz.*, the belief that reality consists of two kinds of substance, a matter stuff and a psychic or mental stuff. But this psychology loads the dice heavily in favor of "consciousness," in that all experience is made to consist of consciousness, so that matter can at best be known only indirectly, by inference. But this psychology necessitated a very different interpretation of experience generally and of the learning process in particular. It was no longer possible to explain by referring everything that happened to the operation of the faculties. Under the new dispensation all explanation had to be in terms of the organization of the elements which constitute consciousness; and this necessity resulted in a very different conception of human nature and of teaching procedure.

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CHAPTER VII

CONSCIOUSNESS AND THE DOCTRINE OF APPERCEPTION

It is apparent even to the casual observer that the shift in position from belief in a substantive mind to the conception of mind as consciousness or an aggregate of mental states carries with it important implications for educational theory and practice. The repudiation of the substantive mind involves, as its implication, abandonment of the belief in faculty psychology and formal discipline. If there is no permanent and changeless entity, such as a doctrine of the substantive mind hypothecates, then the whole notion of formal discipline is clearly out of place. If the mind is made up of a collection of various experiences, the attention of the educator is necessarily directed toward content and toward the idea of the enrichment of experience.

This re-direction of attention, however, brings in its train certain difficulties. What is the teacher to do? These transitory mental states clearly cannot be trained. They do not continue in existence long enough to be trained, even if we knew how to train them or what to train them for. Moreover, the mental state, after it has had its few brief moments before the footlights of consciousness, passes away into the limbo of nothingness, so that training, if it could be applied, would be wasted. The mental states are as different from a substantive

mind as can well be imagined. Instead of being unchanging and abiding, they are essentially fleeting and evanescent, like the lights and shadows on the waves on the sea-beach. If this is the sort of material with which the teacher has to work, what sort of educational program should be adopted?

Before we attempt to supply an answer to this question, it is necessary to examine this new doctrine of mind more in detail. Such examination soon reveals the fact that our mental life or consciousness is more complex than we ordinarily realize. Thus the water in the river looks cold in the winter, the rock looks hard or solid, the knife looks sharp. A moment's reflection will show us, however, that coldness, hardness, and sharpness are not visual qualities at all. They have neither form nor color; they are not directly seen but are *suggested* by what is presented to the eye. To put it differently, the total experience is a compound, which is made up in part by what is directly given through sight and in part by associations due to previous experience. If we analyze the total experience into its parts or elements, we discover that it contains, first, sensory elements or sensations, due to the direct stimulation of the sense-organ concerned; secondly, images, which are copies or revivals of former sensations and which are brought in by association; and thirdly, "affective elements," consisting of pleasure or pain. These elements together form a compound, in much the same way that hydrogen and oxygen combine to form water, and the experience as a whole is called a perception. The elements in question are discovered by a process of self-observation, which is called the method of introspection.

According to this point of view, the primary business of psychology is to determine the structure of the mind or consciousness, by analyzing it into its elements; consequently this psychology is sometimes known as structural psychology or the psychology of structuralism. This psychology takes as its point of departure the proposition that consciousness has a structure which escapes ordinary notice. The experiences which engage our attention are compounds, although we are not, as a rule, aware of the fact. Moreover, every experience has both a foreground and a background. In the foreground is the object with which our attention is occupied; in the background is a great variety of material that is perceived at best but dimly and obscurely. When we once begin to make a study of this background, we find that it contains a surprising amount of content. Let the attention but wander, say to the soles of our feet, to the tips of the elbows, to the small of the back, or to the end of the nose, and we at once discover sensations which, until the spotlight of attention was turned on them, were concealed in the shadows of the background. These sensations were present all the while, but we did not happen to attend to them before.

The suggestion may be made that these sensations which we discover when we attend to them were not present all the while, but came into being at the moment when they became objects of attention. But this hardly squares with the facts. For example, a person sitting in a room engrossed in some work, suddenly becomes aware that the clock has stopped. The peculiarity of such an experience lies in the fact that previous to this moment the person concerned may not have been aware of the

clock at all. He was not conscious of the ticking; yet when the clock stopped he immediately took note of the fact. Such an occurrence is full of mystery, unless we assume that in some way he was conscious of the ticking all the while. His attention was directed toward something else, to be sure, but dimly or marginally his consciousness took note of the clock. If we make an assumption of this sort, we can explain readily why it is that the stopping of the clock should be reported to his attention. His mind was "keeping tab" on the clock all the while, in spite of the fact that he was not aware of doing so.

According to the psychology of structuralism, the field of consciousness is divided into a "focus" and a "margin." The focus is the point of greatest clearness. It is occupied by that to which we attend directly. But besides this focal consciousness there are all degrees of marginal consciousness shading off from the point of greatest clearness to complete obscurity.

It is customary among psychologists to speak of consciousness as a "field" having a sort of central illumination surrounded by an area of less illumination, which becomes darker in proportion to the distance from the center. In the case of a visual field the point of greatest clearness is the point on which the eyes are focused. The more outlying objects, however, are noted in indirect vision, which becomes progressively more obscure as the distance from the center increases. In listening to a lecturer our immediate attention is given to his words and facial expression. We pay no heed to the lights or windows or the other people in the room; yet our attention is aroused if a cloud momentarily obscures the sunlight,

if a curtain flaps, or if someone moves about in the room within the range of our indirect vision. The words and the face of the speaker do not occupy the whole of our consciousness, but are presented in a context which is present, yet not present. In other words, we experience this context in a peculiar way, which is indicated by saying that we have a dim or marginal awareness of it.

The difference between focus and margin is most conveniently expressed in terms of distance from a center. When so expressed it applies quite directly to visual experiences. When we turn to other experiences, however, such as hearing, talking, and smelling, the spacial character of the metaphor becomes more apparent. The contrast between focus and margin obtains in many situations from which the spacial relations are absent. Thus a man eating his dinner may experience elation or depression as a result of business affairs, the details of which linger on in his mind, even if there be no focal awareness of it. An appointment with the dentist may cast a shadow over the hours which precede it, even when the appointment is temporarily forgotten. Similarly a joyful anticipation will cast a rosy hue over all the incidents of the day, in spite of the fact that our attention is not turned in that direction all the time. These illustrations show that the " marginal " consciousness is really diffused over the whole field. Nevertheless, the spacial metaphor is a convenient device. The difference between focus and margin may be expressed in terms of the distance between center and margin in a conscious " field," as we have expressed it just now, or it may be expressed by the symbol of a wave as is done by William James. The crest of the wave represents the focus, from which point it tapers off to

the margin. The advantage of this latter symbolism is that the degree of focalization can be represented by the height of the wave. In moments of day-dreaming or wool-gathering the crest is low; in moments of extreme concentration it is high.

As James points out, the facts of experience conform readily to this distinction. We may have trouble in describing the outlying regions of consciousness, but it is not easy to deny their presence.

"What is the strange difference between an experience tasted for the first time and the same experience recognized as familiar, as having been enjoyed before, though we cannot name it or say where or when? A tune, an odor, a flavor sometimes carry this inarticulate feeling of their familiarity so deep into our consciousness that we are fairly shaken by its mysterious emotional power. But strong and characteristic as this psychosis is — it probably is due to the submaximal excitement of wide-spreading associational brain-tracts — the only name we have for all its shadings is 'sense of familiarity.'"[1]

It is evident that the inclusion of the "margin" adds enormously to what is called the content of consciousness. Just how much is added it is difficult to say, since the boundary of the margin is indeterminate. But however obscure the content may be, the margin is nevertheless there.

"It lies around us like a 'magnetic field,' inside of which our centre of energy turns like a compass-needle, as the present phase of consciousness alters into its successor. Our whole past store of memories floats beyond this margin, ready at a touch to come in; and the entire mass of residual powers, impulses, and knowledges that constitute our empirical self stretches continuously beyond it.

[1] James, W., *Principles of Psychology,* Vol. I, p. 252. Henry Holt & Company.

So vaguely drawn are the outlines between what is actual and what is only potential at any moment of our conscious life, that it is always hard to say of certain mental elements whether we are conscious of them or not."[2]

Even this, however, does not tell the whole story. Besides the marginal field there is, according to some writers, still another area, which James calls the extra-marginal. In James's opinion psychology must take account not only of

"the consciousness of the ordinary field, with its usual centre and margin, but an addition thereto in the shape of a set of memories, thoughts, and feeling which are extra-marginal and outside of the primary consciousness altogether, but yet must be classed as conscious facts of some sort, able to reveal their presence by unmistakable signs. I call this the most important step forward because, unlike the other advances which psychology has made, this discovery has revealed to us an entirely unsuspected peculiarity in the constitution of human nature. No other step forward which psychology has made can proffer any such claim as this."[3]

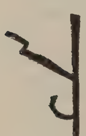
This extra-marginal field is a territory from which various ideas or impulses may erupt into everyday consciousness. It offers a convenient way of explaining such phenomena as alterations of personality and post-hypnotic suggestion. We are told, for example, that a person who is in a hypnotic state may be told that at three o'clock in the afternoon he is to do a certain thing, such as poking the fire, raising the window shade, or pulling off his coat. When the person comes out of the hypnotic state he knows nothing of this instruction; yet when three o'clock comes, he will experience a tendency or disposition to do the thing

[2] James, W., *Varieties of Religious Experience,* p. 232. Longmans, Green and Company.
[3] *Ibid.,* p. 233.

that he has been told to do. He will make some trivial excuse to poke the fire or raise the curtain, being unconscious all the while of the real reason for the act. If we assume an extra-marginal territory of consciousness, the act is very easily explained. In some way or other this extra-marginal territory keeps track of the passage of time, and at the right moment the idea emerges into full consciousness and prompts the act.

Having made this survey of consciousness, we may now return to the question propounded at the beginning of the chapter and inquire how such a doctrine of mind can serve as a basis for educational procedure. Although this doctrine does not regard the mind as an entity, it does provide for a certain kind of permanence or continuity. It furnishes ground for believing that an experience which has come and gone has not really passed out into non-existence, but has merely changed its place of habitation. The experience may continue indefinitely either in the marginal or the extra-marginal territory by which the focal area is surrounded. As a matter of fact, we can not be sure that any experience is completely lost. Apparently it takes up its abode in the "underground life" of the individual, returning occasionally perhaps to the upper regions when recalled by memory, or dwelling uninterruptedly, it may be, in its extra-marginal domicile throughout the lifetime of the individual. The subconscious, as this "underground experience" is called, constitutes by far the greater part of what we ordinarily designate as the mind. The mind is like an iceberg in that the greater part of it is submerged. If we assume that experiences after they have occurred remain in the possession of the individual, we can understand that they may have con-

siderable influence in determining the character of subsequent experiences. They constitute what we call our memories; and these memories enable us to interpret the experience of the moment. A timid person who finds himself near a cemetery on a dark night stands an excellent chance of seeing ghosts, for the reason that any casual object which meets his eye is immediately clothed with a set of qualities which are suggested by past experience. A football scout who is observing the play of a team reads into the various maneuvers all sorts of tactics or plans which are suggested by his previous experience. It is notoriously difficult in reading proof to catch all the misprints, because the mind supplies what is lacking to the eye by converting an *h* into a *b,* a *3* into an *8,* or a *c* into an *o.* As Ruskin remarks, most of our seeing is done behind the eye. Without a background of experience the eye would report almost nothing at all. This background is known in technical jargon as the "apperceptive mass." A background of this sort is involved in all ordinary experience. All perception is apperception.



"To illustrate further, let us construct a figure of three lines, one straight and perpendicular, one broken and oblique, and one curved, thus:

"Sight gives us the figure as it stands, but the apprehension that we get at first view is unsatisfactory. We have perhaps had experience enough with lines to enable us to relate each one to its appropriate class, but we see no idea, no purpose in the whole. Remembering, now, however, that a painter once boasted that he could, by means of three lines, represent a soldier and his dog entering an inn, we can at once associate the hitherto meaningless marks with a system of ideas, and when this is done, the process of apperception may be said to be complete."[4]

[4] De Garmo, C., *Essentials of Method,* p. 25. D. C. Heath and Company.

As a matter of convenience, this account of apperception has taken for granted the existence of both a marginal and an extra-marginal field of consciousness. For present purposes, however, it makes no difference whether or not we believe that our experiences persist indefinitely. We may, if we like, reject the extra-marginal altogether and hold to the view that former experiences recur, not because they have been waiting all the while for their turn before the footlights, but because they are called into being anew by the activity of the cerebral cortex. In either case we are obliged to recognize the fact that our experiences, when they come, are a compound of new and old. We experience things as we do because old experiences come in and blend with the present fact. The old experiences provide a background and give to the new experience its actual character. Consequently the task of education is to make present experiences combine with an appropriate background. By doing this, education gives a person a new world to live in. Training in architecture, for example, enables a man walking along the street to recognize and classify various types of architecture as Colonial, or Greek, or Gothic; training in medicine enables a physician to interpret symptoms; training in language enables us to detect grammatical errors and correctness of sentence construction; training in literature enables us to recognize and appreciate literary excellence, etc. The problem of education, therefore, is to select the right material to form these backgrounds or "apperceptive masses" and to devise a technique for developing them.

This statement of the problem involves a very different approach to teaching. It is in this connection that Her-

bart made one of his chief contributions to educational theory and practice. The importance he attaches to "background" or "apperception" involves the distinction or contrast between what is now called logical organization and psychological organization of subject matter.[5] Logical organization presents the subject matter in final form as a finished product. It is not concerned with the steps in the acquisition of knowledge, but only with the knowledge as a final product, *i.e.*, with knowledge so organized as to facilitate explanation and prediction. Geography is a case in point. The knowledge that men gradually acquired about the earth as a result of explorations and discoveries consisted of a more or less empirical collection of facts, like entries in a notebook, until this knowledge was organized in a certain way. When we learn from modern geography that the earth is round, that it is divided into zones and continents, that climatic conditions and the alterations between day and night have to do with certain relations of the earth to the sun and the like, we get the facts organized into the kind of system that is most useful to the scientist. By what succession of steps this insight was achieved is a matter that does not enter into the account. Geography simply gives us the end-result. The kind of organization typified by geography is sometimes called scientific organization, because it is a kind of organization that makes knowledge an effective instrument for further scientific work. Given such a body of knowledge, it can be used to acquire more knowledge of the same kind.

By contrast psychological organization has reference

[5] *Cf.* Dewey, J., *Democracy and Education,* pp. 256–261. The Macmillan Company.

to the steps that occur in the process of learning. The arrangement of knowledge in logical organization does not represent the order in which the knowledge was acquired. The order of learning is different from the order of logical presentation. Hence it is argued by present-day educators that the subject matter taught in the schools should be reorganized so as to make it conform more nearly to the order of learning. Thus history, it has been suggested, should begin with the present and work backwards; and the same procedure in geography would require "replacing the description of our globe and the proofs that it is a globe by simple geographical studies of the schoolroom, yard and neighborhood." [6]

This distinction between types of organization was of no particular consequence to the "mind" theory. It was interested in subject matter merely as material for the exercise of the faculties. But for Herbart there were no faculties to be exercised. Hence the teaching problem for him became the problem of taking subject matter and weaving it in with the experience that the pupil already has, so as to create a new "apperceptive mass." Consequently the procedure in teaching must be determined, not by the logical order of the topics, but by the steps in learning. What the pupil already knows must be worked over and enlarged so that he may finally achieve a logical organization of his own experiences. There is little virtue in beginning the subject of geography by a study of a globe, because information of this sort is not likely to fuse with what the pupil knows about his immediate surroundings so as to present them in a different light. His background of geographical knowledge must

[6] Thorndike, E. L., *Education,* p. 146. The Macmillan Company.

be gradually enlarged, or the learning becomes mechanical and verbal. The organization of subject matter for purposes of teaching must be very different from organization for purposes of research.

This is only another way of saying that both content and method are much more important from this point of view than from the point of view of the " mind " theory. With regard to content, Herbart could not subscribe to the notion that the study of finished products results more or less automatically in the acquisition of desirable standards on the part of the learner. (*cf.* p. 39). This notion has much less ground to stand on if we deny the existence of a substantial mind. When we begin to feel concern for the development of a proper apperceptive mass, we may need much material that is not in finished form at all. This is quite as true when we are dealing with artistic or literary material as when we have to do with rigidly scientific thinking. Moreover, if we recognize the need of apperceptive masses that will enable pupils to interpret everyday life, it seems reasonably clear that there is need of much wider range of materials than is to be found within the limits of the traditional classical curriculum.

It may be pointed out here, also, that the claims made by traditional education seem to conflict with each other. It is asserted on the one hand that the important thing in education is not subject matter, but the exercise of the faculties; and on the other hand, that the classical curriculum furnishes the best subject matter, because it provides the best models. To be consistent, it should be content to say that the merit of subject matter consists solely in providing sufficient exercise of the proper degree of difficulty. If a faculty is strong, it has no need of models, since

strength is a synonym for excellence. When we say that one *model* is better than another, we shift from " exercise " to content, or, in Herbart's language, we begin to stress the importance of building up a specific kind of apperceptive mass.

In this shift from " faculties " to " apperceptive masses " we secure, furthermore, a different basis for the explanation of transfer of training. With the elimination of the faculties, the notion of transfer through a gain in sheer "power," of course, goes by the board. We are enabled to apply previous experience to new situations by means of the apperceptive masses that we can bring to bear. We have transfer of training just in so far as the new situation is illuminated and transformed by the background of old experiences. In other words, transfer of training is explained, not through a strengthening of the faculties, but through the application of old meanings to new situations.

The significance of Herbart's work for teaching method is no less far-reaching. To supervise or direct the process of assimilation by which apperceptive masses take in new material is very different from and much more difficult than merely providing exercise for mental faculties. The natural result of Herbart's work, consequently, was to give greater importance to the enrichment of the curriculum and to training for teaching. A third contribution made by Herbart was to emphasize the importance of interest in education. Interest is important because it ensures the combination or amalgamation of the material that is taught with old experiences. If the teaching arouses no interest, the subject matter remains isolated, and the purpose of education remains unrealized. The

presence of interest is an indication of the fact that a process of fusion with a larger background is under way.

It is unnecessary for present purposes to go into the details of Herbart's psychology. There is much in his system that has an appearance of artificiality to a twentieth-century reader. Mention may be made, however, of the fact that while Herbart's whole attention is centered on mental states or "ideas," he for some strange reason insists on leaving a place in his theory for a substantive mind. He offers a complicated theory of this mind, the point of which is that for practical purposes it may be disregarded. Apparently Herbart was not quite ready to break completely with tradition, and so the mind is honorably retired on a pension. Or, to change the figure of speech, the mind in Herbart's scheme occupies a status very much like that of a hereditary monarch in a country that is run by a system of popular government. Its position is one of considerable dignity, but little power. As Herbart himself says, "The simple nature of the soul is totally unknown and forever remains so; it is as little a subject for speculative as for empirical psychology." Everything is explained in terms of various alliances or groups that are established among the mental states or "ideas" that arise in the soul. "The soul is regarded as little else than the battle ground of contending ideas." [7]

The teacher's problem, as has already been intimated, centers on these systems or organizations of ideas, which Herbart calls "apperceptive masses," and on the process by which new material is assimilated to these systems, which he designates as the process of apperception. All

[7] Adams, John, *The Herbartian Psychology in Its Educational Applications,* p. 50. D. C. Heath and Company.

learning involves both a background of old experiences and the assimilation of new facts to this background. For example, if a pupil learns about a new animal, his previous knowledge of animals must come into play so as to illuminate the new fact. If he already has a fund of information bearing upon land animals and fishes, this knowledge will be of use in the understanding of animals that live both on land and in the water. It is the teacher's function to see that this background is used, and so used that the new facts are properly assimilated to the old.

In education Herbart is most widely known by his theory of method, which was developed by his successors into the famous Five Steps of the Herbartian Method. These Five Steps are called Preparation, Presentation, Comparison and Abstraction, Generalization, and Application. First, the teacher must remind the pupils of certain facts or experiences with which they are already acquainted and which constitute the apperceptive mass. This is the step of Preparation. Then certain new material is presented, which is Presentation. Then certain comparisons are made for the purposes of determining similarity or identity, which constitute what is called the step of Comparison and Abstraction. Then the results of this comparison are formulated or made definite, which is the step of Generalization. Lastly, the knowledge thus acquired is used for interpreting further facts, which is Application. According to Herbartianism, effective teaching requires that these steps be followed in a fixed order.

In order to illustrate this procedure we may summarize briefly two examples given in McMurry's *The Method of the Recitation*. Let us suppose that the aim of the recitation is to present the subject of "The Irrigation of Arid

Lands."[8] The first step is a discussion of rainfall and a survey of previously acquired geographical knowledge pertaining to the arid regions. This step is supposed to be limited to a consideration of facts with which the pupil is already acquainted. In the second step, a detailed study is made of some irrigation system, which introduces new knowledge. In the third step, this irrigation system, including the topography, rivers, and towns which are important in irrigation, are compared with other irrigation systems, for the purpose of drawing conclusions about the significance of mountains, plains, cities, size of streams, etc., in irrigation. This leads into the fourth step, which consists in specifying the common features of these areas relative to irrigation. The pupils discover, for example, that the areas compared are all arid, that adjacent rivers furnish the possibility of irrigation, that the areas contain large towns which furnish a market for agricultural supplies, etc. The fifth step, Application, would consist in locating other arid regions, discovering the rivers that could be used for irrigation, and the like.

The second illustration [9] consists in a study of the Battle of King's Mountain during the Revolutionary War, for the purpose of showing the energy and patriotism of the common people. The step of Preparation is a survey of previous classroom work, in which maps and books are used, so as to get the geographical and military situation in which this battle occurred. The next step, Presentation, tells the story of the battle in detail, beginning with the sending out of a detachment of 1200 troops by Cornwallis

[8] McMurry, F. and C., *The Method of the Recitation*, pp. 257–269. The Macmillan Company.

[9] McMurry, F. and C., *The Method of the Recitation*, pp. 270–281. The Macmillan Company.

for foraging purposes. In the step of Comparison and Abstraction this battle is compared with the battle of Bennington in Burgoyne's invasion. In the step of Generalization it is brought out that relatively small battles may have a great influence on the fortunes of a campaign and that the spirit of the common people in the two battles was largely the same. The step of Application consists in making comparisons with other battles, such as Bunker Hill, Stony Point, and Saratoga.[10]

It remains to point out the application of the doctrine of consciousness or mental states to the formation of concepts. As was stated earlier, the theory of a substantive mind had its own distinctive explanation of concepts. According to this theory, a concept is either made out of whole cloth by the creative activity of the mind, or else it is made by the abstracting power of the mind, which enables the mind to inspect a number of particulars and take from them that which they have in common, leaving all the other qualities behind. But the present theory has no such convenient agent as a substantive mind, and so it is obliged to account for concepts in some other way. According to the doctrine of mental states, it is possible to secure the common element in a variety of experiences without any help from a substantive mind. Under certain conditions the common element will drop out of itself, so to speak. An illustration is found in what has been called the "composite photograph."

"If we wish to get a typical face, — the typical face of a statesman, or a soldier, or a student, or a consumptive, or a dement, — we photograph a number of individual faces upon the same sensi-

[10] An excellent account of the Herbartian Method is furnished by Bagley, W. C., *The Educative Process,* Chapter XIX. The Macmillan Company.

tive plate. Thus, the composite photograph of ten students would be obtained by photographing each in turn upon the same plate, giving him one-tenth of the normal exposure-time required by the plate. As a result, we obtain a picture in which the resemblances are emphasized and the differences slurred. The abstract idea of a cat, on this analogy, is a reproduction in which all the cat-resemblances are emphasized, and all the cat-differences left faint and obscure."[11]

Stated in brain terms, the formation of concepts, from this point of view, illustrates what James calls the law of dissociation by varying concomitants. A quality like "round" occurs with many objects, such as apples, baseballs, cart-wheels, coins, etc. In reacting to all these objects the reaction to "round" comes into play every time, but the reactions to the other qualities do not. The tendency of this process is to isolate the reaction of "round" from its concomitants, so that it will take place independently; and when this result has been achieved we are said to have achieved the concept of "round." As Thorndike says, "An element [like round] which never existed by itself in nature can influence man almost as if it did so exist, bonds being formed with it that act almost or quite irrespective of the gross total situation in which it inheres."[12]

According to the doctrine of mental states, these concepts are derived from individual notions. The process by which this derivation takes place is laid down in the

[11] Titchener, E. B., *Outline of Psychology*, p. 295. The Macmillan Company. According to some other psychologists meanings or concepts cannot be derived from sensory materials, but must be accounted for in terms of a different conscious element, which is coördinate with sense-impressions and which has sometimes been called imageless thought.

[12] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 161. Teachers College.

Five Steps. The two steps of Comparison and Generalization are specifically the steps that result in the formation of concepts. In order to form concepts it is not necessary to have recourse to a substantive mind.

In summarizing the contribution made by the doctrine of mental states, particularly as represented by Herbart, four items are of outstanding importance. In the first place, this doctrine started the reaction against formal discipline. Secondly, it emphasized the importance of content and so prepared the way for the enrichment of the curriculum. Thirdly, it gave a much more adequate recognition to the place of interest in the learning process. Fourthly, it directed attention to the importance of teaching method, which was profoundly influenced by the work of Herbart.

Nevertheless, the Herbartian system as a system is now largely of historical interest only. In the course of time this system was found to be afflicted with a certain formalism which mechanized educational processes. This mechanizing was not accidental but was due to conditions inherent in the system itself. The reason why Herbartianism had to be superseded will become more apparent as we proceed.

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CHAPTER VIII

THE RISE OF PHYSIOLOGICAL PSYCHOLOGY

To a modern reader the psychology of the eighteenth and the early nineteenth century is curiously indifferent to the dependence of the mind on the body. The older psychology was interested primarily in the groupings and associations of the elements composing our experiences, and referred to the body mainly in a casual and incidental way. When we come to the second half of the nineteenth century, we find more emphasis on bodily processes, but at the same time the procedure of the earlier psychologists was extended and refined. The number of elements which were listed runs into the thousands, and their various blendings and amalgamations, which were sometimes designated as a "mental chemistry," were studied with great care. The chief business of the psychologist was still with the analysis of mental compounds, and the method upon which he placed his chief reliance was the method of introspection or self-observation. "We 'look into the mind,' each for himself; or we observe ourselves . . . in order to find out what processes are going on at the time, and how they are influencing one another."[1]

One reason why more attention came to be paid to physiological processes was that these often furnish a convenient clue to unnoticed mental elements. The sensa-

[1] Titchener, E. B., *Outline of Psychology*, p. 32. The Macmillan Company.

tions of eye-strain are a case in point. When we are looking at an object that is a considerable distance away, the eyes are converged but little. In proportion as the object comes closer the convergence increases. If we try to look at an object like the end of a lead pencil, when it is held halfway between the eyes and a few inches from the face, the convergence becomes so great as to produce an unpleasant strain in the muscles of the eyes. It is when the strain reaches a certain degree of intensity that we become aware of it. But there are sensations of strain even when we do not notice them, and it would be no easy matter to locate these sensations if the physiological processes did not point the way. Experimental evidence has been adduced to show that these unnoticed sensations of strain are a factor in determining judgments of distance. The same applies to estimates of visual magnitude or extent.

"There is good reason for thinking that our estimation of visual extent is originally made by the help of the intensity of strain sensations. Each eye is slung in its socket upon six separate muscles. When we compare two lines, the natural thing to do is to 'run the eyes along them'; and this movement of the eyes calls forth sensations of muscular contraction or tendinous strain. A longer line occasions a more severe (stronger) strain, and a shorter line occasions a less severe strain. We estimate extent in terms of intensity." [2]

But a further and more potent reason for studying physiological processes lies in the fact that physiology furnishes an opportunity to explain what is going on. Analysis can tell us of what constituents or parts a given compound is made up, but it does not shed much light on

[2] Titchener, E. B., *An Outline of Psychology*, p. 83. The Macmillan Company.

causal connections; *i.e.,* it does not seek to ascertain the conditions under which events take place. If the mind is dependent on the body, it is evident that knowledge of causal connections must be secured through the study of physiological processes.

In the matter of causal connections the older psychology left much to be desired. Faculty psychology was usually content to say that our experiences were due to the activity of the mind. But, as James points out, it is no explanation of memory to say that we remember because we have a Faculty of memory. This is not explanation, but naming, since it adds no new insight, no new understanding of the relations between the remembered fact and other facts.

> "Why should this absolute godgiven Faculty retain so much better the events of yesterday than those of last year, and, best of all, those of an hour ago? Why, again, in old age should its grasp of childhood's events seem firmest? Why should illness and exhaustion enfeeble it? Why should repeating an experience strengthen our recollection of it? Why should drugs, fevers, asphyxia, and excitement resuscitate things long since forgotten? . . . Evidently, then, the faculty does not exist absolutely, but works under conditions; and the quest of the conditions becomes the psychologist's most interesting task." [3]

When the belief in a substantive mind was finally given up, psychology attempted to explain everything in terms of association. Thus the rumble of distant thunder suggests lightning, because these things have been associated together previously in our experience; or the clouds in the sky suggest a snowbank, because the two have a certain resemblance. This is good enough, as far as it goes, but it does not go very far. As James insists, it "does not ex-

[3] James, W., *Psychology,* Vol. I, pp. 2, 3. Henry Holt & Company.

plain the effects of fever, exhaustion, hypnotism, old age, and the like." Here again we are forced to the conclusion that association works under conditions; and these conditions are of a physiological sort. The functioning of remembering varies with the condition of cerebral cortex. To explain remembering by reference to associations is not to say the last word, for the sufficient reason that association in turn depends upon processes that take place in the brain.

It is not surprising, therefore, that psychology in its later development should go hand in hand with the study of physiology. The study of physiological psychology, however, had not gone very far before it began to appear that the interdependence of mind and body was much more extensive and intimate than had first been supposed. The earlier notion of a "mind" — whether the term mind be understood to mean a substantive entity or a collection of discrete states — which was capable of acting quite independently of the body, was found to be a myth. The effects of stimulants, brain disease, narcotics, exhaustion, weather, old age, and the like all tend to show that "consciousness is inseparably bound up with the brain process, and cannot take place in its absence." [4]

There is no space here to review the evidence in detail. In general, however, we may say that all consciousness appears to involve movement of some sort; which disposes of the notion that the mind may act in complete independence of the body. Thus experiments have shown that if a person thinks of his feet or of his home, or of any other objects to which his thought assigns a more or less

[4] Strong, C. A., *Why the Mind has a Body*, p. 37. The Macmillan Company.

definite place, the muscles of his body respond in such a way as to indicate the direction of that place.[5] What is ordinarily called mind-reading is just a case of muscle-reading. The old joke to the effect that some city apartments are so small as to make it necessary for an occupant to go out into the hall in order to change his mind is by way of receiving scientific sanction. It is literally necessary to have room for the purpose of changing one's mind. No psychosis without neurosis — no mental change without concomitant bodily change — is the verdict of present day science.

At first the development of physiological psychology was merely in the nature of expanding and amplifying the work of the earlier psychology. Eventually, however, the results of physiological psychology began to react on the original point of view. The results secured from the study of the interrelation between mind and body have had a tendency to encourage a revision of the earlier point of view and even to justify an abandonment of it altogether. In particular these results raised a doubt whether it is permissible to assume that subconscious ideas exist, or to assume that our experiences are composed of elements which, though they enter into all sorts of combinations, remain fixed and unchanged throughout, like the hypothetical atoms so long used by physical science to explain the constitution of physical bodies.

It is not difficult to see how this came about. We are apt to assume that any excitation of a sense-organ, if

[5] Some of the earlier experiments in this field are recorded by Jastrow, *Fact and Fable in Psychology,* in the chapter entitled *A Study of Involuntary Movements.* Houghton Mifflin Company. *Cf.* also James, W., *Psychology,* Vol. II. Chapter XXIII. Henry Holt & Company.

repeated, will produce the same sensation. This assumption, however, fails to take account of the changes that inevitably take place in the nervous system and of the fact that when the stimulation is applied the second time it has to deal with a different nervous system. As James says: "For an identical sensation to recur, it would have to occur the second time in *an unmodified brain*."[6] Since the brain is constantly being modified, it appears that the notion of an identical sensation is only a convenient abstraction and never an actuality.

When we examine the matter further, the evidence for this conclusion is strengthened. A reaction on the conscious level is never a simple case of stimulus and response. A variety of activities occur in the body simultaneously, so that the response of the body is really the outcome of various interactions among a variety of impulses. These interactions go by the name of *facilitation* and *inhibition*.

"We see excellent examples of cerebral facilitation and inhibition in the case of the knee jerk. This sharp forward kick of the foot and lower leg is aroused by a tap on the tendon running in front of the knee. Cross the knee to be stimulated over the other leg and tap the tendon just below the knee cap, and the knee jerk appears. So purely reflex is this movement that it can not be duplicated voluntarily; for, though the foot can of course be voluntarily kicked forward, this voluntary movement does not have the suddenness and quickness of the true reflex. For all that, the cerebrum can exert an influence on the knee jerk. Anxious attention to the knee jerk inhibits it; gritting the teeth or clenching the fist reinforces it. These are actual influences acting by way of the pyramidal tract upon the spinal center for the reflex."[7]

[6] James, W., *Psychology*, Vol. II, p. 232. Henry Holt & Company.
[7] Woodworth, R. S., *Psychology*, pp. 54, 55. Henry Holt & Company.

When we reflect on the complexity of even our simplest responses and on the endless possibilities of variations and shadings, the suggestion that our experiences are made up of identical sensations begins to appear fantastical. If we hold that every mental element, like every physical element, is subject to the stress and strain produced by the entire situation, then the likelihood of exact repetition is negligible. Why then are we so easily misled into thinking that a given part of an experience is the same as in a previous experience? A person may feel sure, for example, that this particular shade of color is identical with the one that he saw a few moments before. The explanation, as James assures us, is not difficult. In terms of objective fact the color may indeed be entirely the same. Regarded as mental states, however, the two colors, as James maintains, are not the same. "What is got twice," he says, "is the same object."[8] Stated more precisely, what is got twice is the reference or inference to an identical object. The only thing that is "got" immediately, according to James, is a complex mental state. No such mental state is quite like any other, either in its totality or in its constituent parts.

This fact, however, is overlooked, because a variety of different mental states may refer to the same external object. Whenever this occurs, we tend to assume that the different mental states which refer to the object are likewise the same. The object being the same, we all unconsciously slide into the habit of taking for granted that the experiences which refer to this same object are qualitatively the same experiences and made up of the same elements.

[8] James, W., *Psychology,* Vol. I., p. 231. Henry Holt & Company.

The assertion that mental states referring to the same objects may differ widely from one another has considerable evidence back of it.

"The grass out of the window now looks to me of the same green in the sun as in the shade, and yet a painter would have to paint one part of it dark brown, another part light yellow, to give its real sensational effect. We take no heed, as a rule, of the different way in which the same things look and sound and smell at different distances and under different circumstances. The sameness of the Things is what we are concerned to ascertain; and any sensations that assure us of that will probably be considered in a rough way to be the same with each other. This is what makes offhand testimony about the subjective identity of different sensations well nigh worthless as a proof of fact. . . . Helmholz calculates that the white marble painting in a picture representing an architect's view by moonlight is, when seen by daylight, from ten to twenty thousand times brighter than the real moon-lit marble would be." [9]

The conclusion, however, that mental states never recur, either in whole or in part, means a complete change of front. There appears to be no longer any need of a "subterranean" region, called the realm of the subconscious, to which our "ideas" can retire after their brief moment before the footlights of everyday consciousness. The only reason for assuming such a region is to explain such facts as memory, or to explain our ability to take account of facts when we are not attending to them, as in the case of becoming aware that the clock has stopped. The subconscious becomes a convenient repository for ideas when we don't happen to be using them. But if every experience is qualitatively new, we can never use an old idea over again, and so there appears to be no need

[9] James, W., *Psychology,* Vol. I., pp. 231, 232. Henry Holt & Company.

of a repository. The subconscious is, in very truth, a bourne whence no traveler ever returns, and so it can be left out of account. It is not really needed anyhow. Memory does not require that ideas be kept on deposit, but is explained quite as well by the theory that certain brain-processes are reinstated. And it may be that such a phenomenon as noting the stopping of the clock can also be explained adequately in terms of physical responses. We have evidence to show that when we are engaged in reading a book, for example, the ear lends assistance to the eye by shutting out disturbing sounds. Instead of being "set" to hear sounds, we are "set" not to hear them, which is an equally positive reaction. While we are reading, the ear coöperates with the eye by shutting out the stimulation that comes from the ticking of the clock. When this stimulation is suddenly withdrawn, the ear is set to resist an impact which does not arrive. The result is something like what happens when we come down stairs and find that there is one more step than we had expected. That is, we are "set" to step on the solid floor, but step into a vacuum instead, so that there is a hasty readjustment of response to inform us of what has happened.

This is, of course, only a more or less figurative explanation of the phenomenon in question, but it serves to indicate that there is an alternative to the explanation by means of subconscious ideas. Moreover, this alternative type of explanation has the great advantage of being couched in terms of objective fact. We can be reasonably sure that we have a body and that the body makes responses of various kinds. We do not have the same assurance that there are subconscious experiences. In fact the whole notion of the subconscious seems to involve a con-

tradiction. It is of the essence of a pain, for example, that it hurts. If the hurt disappears, the pain is gone, and it would be just plain obscurantism to talk of a subconscious pain. A pain of this kind would be a pain that did not hurt. We may suppose that the nerve of an aching tooth continues to vibrate after a person has fallen asleep, but it is nonsense to say that the pain still continues in the realm of the subconscious. This conclusion can be generalized. We know what it is to have experiences of colors, sounds, and the like, but when we transfer these experiences to the realm of the subconscious we find ourselves talking about unexperienced experience or unconscious consciousness. This is mythology of a peculiarly vicious kind.

A little reflection will show that the same kind of consideration applies to the theory that our experiences consist of "elements." To look for the "elements" of experience is to look for an unexperienced part of experience. The elements are not directly experienced; if they were, there would be no need of looking for them. Consequently this whole industry of analysis is a quest for "unconscious consciousness." To quote again from James:

> "Each of them [the mental states] is a conscious fact; none of them has any mode of being whatever, except a certain way of being felt at the moment of being present. It is simply unintelligible and fantastic to say, because they point to the same outer reality, that they must, therefore, be so many editions of the same 'idea,' now in a conscious and now in an 'unconscious' phase. There is only one 'phase' in which an idea can be, and that is a fully conscious phase. If it is not in that condition, then it is not at all. Something else is, in its place." [10]

[10] James, W., *Psychology,* Vol. I., p. 173. Henry Holt & Company.

According to James, then, the "analysis" of mental states is not an analysis of consciousness at all, but an analysis of the object, or perhaps of the physical reaction which is involved in our experience of the object. We are told, for example, that "the 'taste' of tea is made up of a bitter taste, a scent, temperature sensation, and an astringent (cutaneous) sensation."[11] That is, what we call the "taste" of tea is really a collection or sum of different elements, only one of which has anything to do with taste. Consequently, as Titchener remarks, "'tea tasters' and 'wine tasters' should rather be called 'tea' and 'wine smellers.'" But if we should see fit to call them "smellers" rather than "tasters," it would be because we have discovered that they use the nose more than they do the tongue in making their judgments. The tea stimulates the one organ more than it does the other. This is a simple and verifiable statement. On the other hand, the allegation that the taste consists of various elements called sensations which we "have" without knowing it, is not verifiable, and is not even intelligible. When we have analyzed out the properties of the object which stimulate the sense-organs and have correlated these properties with the bodily reactions which they call forth, the job is done. The rest is not psychology, but mythology.

If we follow out the implications of this position, we find ourselves led to a different conception of psychology. The business of the psychologist is not to conduct a still hunt for non-existent "elements" in the privacy of his own bosom, but to study what we call experience for the purpose of discovering its conditioning factors. These

[11] Titchener, E. B., *Outline of Psychology*, p. 54. The Macmillan Company.

factors, we find, are partly in the environment and partly within the body. Thus the experience of drinking tea results from the reaction to a certain stimulation applied to the nose and the interior of the mouth. This reaction is complicated and shows considerable effects of previous reactions. Thus, in spite of the fact that the physical stimulations may vary from dark brown to bright yellow, grass is seen as green, because a certain pattern or type of reaction has been built up within the body as a result of previous experience. In brief, the psychologist becomes less interested in the study of "experience" or "consciousness" as a detached fact, apart from objects, and devotes himself rather to the study of the responses which the organism makes to its environment.

The bearing of this change in attitude or purpose is far-reaching. It means that the psychologist gives up trying to distinguish between the physical or objective "tea" and our experience of drinking tea. He is no longer concerned to maintain that the qualities of "hot" and "bitter" which we experience in drinking tea are really subjective; that they are really "in us" and not in the tea. He can get along quite well with the assumption that these qualities are really in the tea, as common sense says they are. What interests him is to study the way that the organism behaves. If the tea is hot, we must drink it slowly, without audible sipping or blowing to cool the tea. In other words, the drinking is a purposive activity, and it is a matter of some interest to ascertain whether or how such an activity differs from the operations of a machine. The psychologist is not content to say that our manner of drinking tea is due to control by a "mind" or "consciousness." To explain things by saying that they are due to

the action of "consciousness" is as objectionable as to explain them by reference to a "mind" or to a "faculty." We want to know just how our reflex or instinctive modes of behavior become transformed into purposive conduct.

If we apply this type of explanation to transfer of training, we find (a) that Herbart's apperceptive masses can be reduced to more or less complex physiological reactions, and (b) that physiological habit becomes a probable factor in transfer. The reactions of the body, as we know, are subject to the law of habit. Furthermore, habits can be applied to different objects, in spite of a certain range or variety of differences among them. Habits can be *generalized*. It would seem, therefore, that habit furnishes a valuable clue to the explanation of transfer.[12]

Another outcome of physiological psychology was an increased recognition of "original tendencies" in human behavior. These original tendencies relate to behavior that is determined by the native structure of the organism, apart from learning. To quote Thorndike:

> "Three terms, reflexes, instincts, and inborn capacities, divide the work of naming these unlearned tendencies. When the tendency concerns a very definite and uniform response to a very simple sensory situation, and when the connection between the situation and the response is very hard to modify and is also very strong so that it is almost inevitable, the connection or response to which it leads is called a reflex. Thus the knee-jerk is a very definite and uniform response to the simple sense-stimulus of sudden hard pressure against a certain spot. It is hard to lessen, to increase, or

[12] Bagley, W. C., *The Educative Process,* Chapter XIII, The Macmillan Company, and Colvin, S. S., *The Learning Process,* Chapter XV, The Macmillan Company. — It should be added, however, that both of these authors insist that consciousness plays a rôle in transfer which is not reducible to habit. Transfer, according to Bagley, depends chiefly on a "conscious factor," *viz.,* ideals, which fall outside the realm of habit.

otherwise control the movement, and, given the situation, the response almost always comes. When the response is more indefinite, the situation more complex, and the connection more modifiable, instinct becomes the customary term. Thus one's misery at being scorned is too indefinite a response to too complex a situation and is too easily modifiable to be called a reflex. When the tendency is to an extremely indefinite response or set of responses to a very complex situation, and when the connection's final degree of strength is commonly due to very large contributions from training, it has seemed more appropriate to replace reflex and instinct by some term like capacity, or tendency, or potentiality. Thus an original tendency to respond to the circumstances of school education by achievement in learning the arts and sciences is called the capacity for scholarship." [13]

Educationally these original tendencies were held to be of importance for two reasons. One was that these instincts make their appearance at different times during the period of childhood, and that, consequently, the teacher must be on the lookout for them and be prepared to exploit them when they arrive. Imitation, collecting, and construction, for example, are instincts that come at their appointed time, and bring the golden opportunity of the teacher. A second reason was that instincts set certain limits to educability. Before the instinct has arrived or after it has disappeared education can do little.[14] Moreover, man has the instincts to fight and to acquire or possess, which make it inconceivable that war should ever

[13] Thorndike, E. L., *Educational Psychology* (Briefer Course) p. 4.

[14] *Cf.* James, W., *Talks to Teachers,* Chapter VII, Henry Holt & Co.; also Thorndike, E. L., *Educational Psychology* (Briefer Course), pp. 111–115, Teachers' College. — The list of instincts which James credits to man is as follows: climbing, imitation, emulation, rivalry, pugnacity, anger, resentment, sympathy, hunting, fear, appropriation, acquisitiveness, kleptomania, constructiveness, play, curiosity, sociability, shyness, cleanliness, modesty, shame, love, jealousy, parental love. *Cf.* Watson, J. B., *Behaviorism,* Chapter V. W. W. Norton & Co.

be done away with or that society should ever be organized on a fundamentally different economic basis.

This doctrine of original tendencies was given an interesting and influential application in what is known as the culture epoch or recapitulation theory. This theory takes its point of departure from the proposition that the life history of the individual, from the embryo to maturity, repeats or recapitulates the history of the race from the simpler through a succession of more complex forms. This recapitulation, it is claimed, reproduces not only the changes in physical structure that took place in the course of racial development, but also rehearses the activities of the different periods. These racial activities are represented in the individual in the form of original, unlearned tendencies. Thus the race at one time perhaps was arboreal in its habits, at another time it was migratory, or pastoral, or agricultural, and so on. This succession of activities is repeated, more or less faithfully, in the instincts or original tendencies of the growing child. Since education should take its clue from these original tendencies, it would seem that this recapitulation should determine the character of the curriculum. With reference to physical activities, the original tendencies should find opportunity for expression, in proper sequence, in climbing, in taking care of pets, in raising plants, in spinning and weaving, etc. On the mental side, the curriculum should include myths, folk-tales, and songs expressive of the particular culture epoch that corresponds to the original tendencies which are dormant at any given time.[15]

[15] *Cf.* Thorndike, E. L., *Educational Psychology* (Briefer Course), Chapter VIII. Teachers' College. Also Dewey, J., *Democracy and Education,* pp. 84–89. The Macmillan Company.

The recapitulation theory, in full-fledged form, is now mainly historical. It has, however, left as a legacy a regard for original tendency that sometimes borders on superstitious reverence. In the past this has found expression in the doctrine that "nature is infallible," *i.e.*, that it is wrong to interfere with these tendencies, or to apply any form of coercion.[16] At present it still crops out in theories of "freedom," which set sharp limits to direction or guidance on the part of the teacher. With reference to the familiar question of heredity versus environment it leans strongly towards the side of heredity. A reverberation of this bias in favor of heredity appears in the recent development of mental testing. The assumption is made that mind or intelligence is antecedently determined by heredity, and that the influence of the environment is slight.

"Those who evince a given degree of mentality have it as a possession as inherently as they have blue eyes or Roman noses. Unconsciously the school, year after year, sifts through meshes of larger and larger size those who are relatively less capable, and retains those whose endowments mark them for intellectual success.

"As an institution devoted to preparing the young for more complete living, the school has always been so much an agency of selection that it is a question whether those who receive its benefits are as much developed as they are *certified* for the affairs of life."[17]

It must not be supposed that this change of emphasis in favor of explanation in terms of physiology and heredity came about all at once. For a long time physiological psychology continued the practice of making "conscious-

[16] *Cf.* Thorndike, E. L., *Ibid.*, Chapter IX.

[17] *Journal of Educational Research,* Editorial, February, 1921, quoted by Bagley, W. C., *Determinism in Education,* p. 14. Warwick & York.

ness" a distinct and more or less undetermined agency for explaining human behavior. But it became increasingly apparent that such explanation was perfunctory and verbal. This result was emphasized by the difficulties encountered in explaining the relation of "mind" or "consciousness" to the body. Common sense is content to assume that mind and body interact with each other. But when we look into this matter further, we run head on into the mind-body problem, which has caused no end of perplexity and which has never attained a satisfactory solution.

The source of this difficulty lies in the fact that mind and matter seem to have no common denominator. We know little enough at best about the nature of causation; but at all events the interaction of physical objects goes on among objects all of which occupy space. When we try to understand such a process, we aim to trace its course along a line of physical movements. Thus when we set a row of bricks on end in such a way that when the first brick in the row is knocked down all the bricks go down successively, every part in the process is embodied in a form of movement. But when we deal with the relation of mind and body, the situation is different. The mind or consciousness does not occupy space; consequently, if matter acts on mind, the sequence of movements is interrupted. The effect of the antecedent physical process does not show itself in a subsequent movement, but seems to disappear into a fourth dimension. Just what happens we cannot guess, even remotely. Presently the mind does something to the body, which means that a certain amount of force or energy emerges from this fourth dimension and sets up certain movements. Perhaps this is what

actually happens, but the whole business looks suspicious enough to give us pause.

The only effect of further study is to deepen the mystery. How can a non-spacial, disembodied "idea" do anything to the brain? Does it exert some sort of push or pull on the molecules in the cortex, and, if so, does it operate from the top or from the bottom or from the side of the brain? Such questions are, of course, nonsense. Since mental states are not in space, we cannot ask in which direction they push or pull. It is a problem without any discoverable head or tail. To understand the action of mental states on brain states is about as difficult as to understand how the square root of minus two can help to lift an automobile out of the ditch. As W. K. Clifford says: "It will be found excellent practice in the mental operations required by this doctrine to imagine a train, the fore part of which is an engine and three carriages linked with iron couplings, and the hind part three other carriages linked with iron couplings; the bond between the two parts being made up out of the sentiments of amity subsisting between the stoker and the guard."[18]

Eventually most psychologists came to the conclusion that the belief in interaction between mind and body must be discarded and to adopt instead the theory of parallelism, which holds that the mental series and the physical series go on side by side, but without causal relationship. The mind does not control the body any more than our shadow controls our walking or the speedometer controls the speed of the automobile. We may say that the mental states merely register the bodily happenings,

[18] Quoted by James, W., *Psychology*, Vol. I, p. 132. Henry Holt & Company.

except that there is no causal relation of any sort. There must be some sort of relationship, of course, to account for the concomitance, but this was regarded as a question outside the province of psychology; it was a question for philosophy. From this point of view, it is evident that human behavior can be explained or described either in terms of mind or in terms of body. Each series is complete in itself.[19]

This doctrine of parallelism has the obvious disadvantage that it leads into a disquieting sort of mystery. It asserts that pinpricks are not the cause of pain, but that the pricks and the pain come and go together. This concomitance is admittedly not just a coincidence, but on the other hand we are forbidden to construe the relation in terms of causation. But if the relation is not a causal relation, what sort of relation is it? The question is not easy to answer. Huxley's doctrine of *conscious automatism,* which may be regarded either as a modified parallelism or as a modified interactionism, is an attempt to escape from the difficulty. According to Huxley, the body can produce experiences or mental states, but these mental states have no power to change the workings of the body. Our experiences simply record the reactions that take place in the body, just as the barometer records changes in air pressure. As Huxley says:

"The consciousness of brutes would appear to be related to the mechanism of their body simply as a collateral product of its working, and to be as completely without any power of modifying that working as the steam-whistle which accompanies the work of a locomotive engine is without influence upon its machinery. Their

[19] For a detailed statement of the different psychological theories regarding the relation between mind and body see Strong, C. A., *Why the Mind has a Body,* chapters IV, V, VI, and VII. The Macmillan Company.

volition, if they have any, is an emotion indicative of physical changes, not a cause of such changes. . . . There is no proof that any state of consciousness is the cause of change in the motion of the matter of the organism. If these positions are well based, it follows that our mental conditions are simply the symbols in consciousness of the changes which take place automatically in the organism; and that, to take an extreme illustration, the feeling we call volition is not the cause of a voluntary act, but the symbol of that state of the brain which is the immediate cause of the act. We are conscious automata." [20]

For present purposes it does not matter a great deal whether we hold to parallelism or to conscious automatism. From either point of view we are encouraged to make psychology a study of behavior. More specifically, the situation invites us to try explaining human behavior in terms of bodily processes alone. Why not ignore what we call "mind" altogether and confine ourselves to a description of how the organism behaves? A procedure of this kind has the advantage of being strictly objective, in the sense that different observers can watch the same fact and can verify what they see. This is not true in the same sense in introspection. If a person watches what is taking place in his own inner consciousness, other observers cannot share in the observation, and cannot check in any direct fashion on the report that the introspecting observer may see fit to make.

The movement in the direction of substituting physical processes for mental processes as terms of description and explanation in psychology has gained considerable headway and is now known as Behaviorism. At the outset

[20] Huxley, T. H., *Science and Culture.* The two passages here quoted are from the chapter *On the Hypothesis that Animals are Automata.*

this movement was content to make the assertion that mental or psychic facts need not be considered, since all the relevant facts can be secured by a study of behavior and of physiology. We may admit the existence of "consciousness," but nothing is gained by taking it into account. As time went on, however, the movement gained courage, and presently the claim was advanced, more or less frequently, that "mind" could be ignored, not merely because it was irrelevant to the purposes of the psychologist but because it was really non-existent. The assertion was made that what is called mind is in reality reducible to a bodily process. Physics, for example, reduces the phenomena of light and sound to terms of wave motions; and a similar reduction is possible with mental phenomena. Thus a pain, an emotion, or the perception of a sound or a color, is in reality nothing but a physical process going on in the cerebral cortex. Mind and matter are fundamentally the same thing. Everything that we call personal experience is reducible to forms of movement.

A doctrine of this sort is bound to have considerable significance for our interpretation of the educative process. If this doctrine is true, then obviously the emphasis in teaching should fall not on the organizing or relating of "ideas," but on the cultivation of modes of behavior. From the point of view of behaviorism, education consists of a process of substituting new forms of behavior for old ones. The forms of behavior with which we are born are known as reflexes; the forms of behavior which are substituted for them are designated by such names as "acquired reflexes," "conditioned reflexes," or habits. Habit becomes the fundamental category in education. The more detailed bearings or implications of this con-

ception will be discussed at a later time, after we have had an opportunity to examine the doctrine of behaviorism more in detail.

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CHAPTER IX

THE PSYCHOLOGY OF BEHAVIORISM

The movement in psychology known as behaviorism is still young, less than twenty years old. Its manners occasionally exhibit the familiar traits of adolescence, especially in taking delight in shocking the susceptibilities of its elders, who are often frankly puzzled by this new phenomenon. The antipathy of behaviorism to anything that goes by the name of mind, soul, or consciousness has to them the appearance of unreasonableness, not only in its violence but in its determination to explain away the facts of everyday life.

This appearance of unreasonableness loses much of its quality if we keep our eye on the historical setting of behaviorism. This new movement is not just a sudden and unaccountable explosion, like a bomb dropped from an unseen airplane, but the crystallization of a tendency that was a long time on the way. For centuries the best minds of the race had wrestled with the problem of dualism, and the story of this struggle is a record of futility. With the development of physiological psychology the emphasis had shifted more and more towards explanation in terms of observable behavior. Wherever possible, the old explanations in terms of mind were superseded by explanations in terms of the nervous system. A tendency of this sort, as we can see now in retrospect, was altogether likely to culminate in a behavioristic view of psychology.

All that was needed was to discern the tendency and to anticipate its outcome.

It is easy, of course, to simplify things in retrospect. We are likely to forget that the behaviorists, like everyone else, were nurtured in the dualistic tradition, and that emancipation from a tradition may require a large measure of intellectual independence and resourcefulness. In fact, the first operations of the behaviorists were not so much frontal attacks as flanking movements. They did not challenge outright the existence of consciousness, but raised the question of method. Traditional psychology had depended almost exclusively on introspection, but why continue to do so? When observers disagreed in their findings, there was no way of settling the disagreement. In the analysis of visual perception, for example, different observers made different reports as to the number of shades of color or degrees of brightness that could be detected. Introspection did not prove anything. Moreover, we have at hand a method that is objective and final. In certain experiments with rats it was found that the rats could be trained so as to go to a food box when a green light was displayed and to avoid the box when a red light was shown. The experiment proved beyond peradventure that the rat was capable of distinguishing in some way between green and red. It was quite unnecessary to consult the introspective findings of the rat. All that was necessary was to observe his behavior. Experiments of this sort, can, of course, be made on human beings quite as readily, and they can be refined without assignable limit. We have in this method a procedure that is objective and scientific. Why not abandon the method of introspection altogether and make psychology a real science?

In a plea of this sort it is not necessary to argue that there is no such thing as consciousness, but simply that psychology has no more to do with consciousness than any other science. We may grant that a physicist, for example, has consciousness and that he uses consciousness in making and recording his observations. The physicist may use consciousness, but he does not study it. His business is with the properties and relations of matter. Similarly the psychologist may use consciousness, but he is not called upon to study it. His business is with certain forms of behavior.

"Will there be left over in psychology a world of pure psychics, to use Yerkes' term? I confess I do not know. The plans which I most favor for psychology lead practically to the ignoring of consciousness in the sense that the word is used by psychologists today. I have virtually denied that this realm of psychics is open to experimental investigation. I don't wish to go further into the problem at present because it leads inevitably over into metaphysics. If you will grant the behaviorist the right to use consciousness in the same way that other natural scientists employ it — that is, without making consciousness a special object of observation — you have granted all that my thesis requires."[1]

Before long, however, the cloven hoof began to show itself. In proportion as the new method yielded results and seemed adequate for the purposes of the psychologist, the old psychology became more and more artificial and unreal. The behaviorist developed an attitude towards the traditional psychologist akin to that of the trained physician towards a witch-doctor. Why put up any longer with the superstitions of the past? Science leaves no place for consciousness. Behaviorism's challenge to

[1] Watson, J. B., *Psychology as the Behaviorist Views it*, Psychological Review, 1913, Vol. 20, p. 175.

introspective psychology was: "You say there is such a thing as consciousness, that consciousness goes on in you — then prove it. You say that you have sensations, perceptions and images — then demonstrate them as other sciences demonstrate their facts." [2]

The demonstration demanded by the behaviorist naturally was not forthcoming. The only way in which access can be gained to these inner mental facts is by introspection, and introspection falls far short of demonstration. Since direct demonstration is impossible, the issue takes this form: can behaviorism give a satisfactory account, in terms of behavior, of the various facts which have hitherto been recognized as mental facts? More specifically, can perceiving, imaging, thinking, willing, and all the other forms of experience, be adequately explained as just forms of behavior?

Before taking up this question, let us ask just what is meant by "behavior." The behaviorist's reply to this question is simple and direct. Human behavior is the same *kind* of thing as any other behavior. A machine behaves as it does because it is constructed in a certain way out of certain materials. A human being, similarly, behaves as he does because he is organized in a certain way and consists of protoplasm. The one is no more mechanical than the other. "The behaviorist is a mechanist? Yes, utterly." [3] For practical purposes the term mechanism means simply that such concepts as "foresight" and "purpose" can be dispensed with. Behavior is mechanical when it is described in terms of physics and

[2] Watson, J. B., *The Ways of Behaviorism,* p. 7. Harper & Brothers.
[3] Watson, J. B., *The Ways of Behaviorism,* p. 42. Harper & Brothers.

chemistry. "Behaviorism in psychology is merely the name for that type of investigation and theory which assumes that man's educational, vocational, and social activities can be completely described or explained as the result of the same (and no other) forces used in the natural sciences." [4]

At first sight the proposal to explain human behavior in purely mechanistic terms seems fantastical. It seems self-evident that we are perceiving, thinking, and volitional beings, as different as possible from the inanimate and inert contrivances which we call machines. But appearances are sometimes deceiving. It has long seemed self-evident that man had a "soul" or "consciousness" which made him different from machines, but this notion seems to have been a mistake. If so, we cannot be sure beforehand that there is any fundamental difference at all. The facts must decide.

Let us then undertake a brief review of the behavioristic explanation of the facts which we have been accustomed to regard as mental. First of all, we may consider sense-perception. Here we encounter at once such phenomena as illusions, the variations known as the relativity of sense-perception, and the like. Facts like these seem clearly subjective or mental. Do they not prove conclusively that man is different from a machine?

In reply the behaviorist points to the fact that sense-perception, like all other experience, is conditioned by the nervous system. We see colors and hear sounds because certain reactions are set up. The original reactions soon become overlaid with all sorts of habits that are built up

[4] Weiss, A. P., *A Theoretical Basis of Human Behavior,* p. 7. R. G. Adams & Company.

in connection with external stimulations. Thus we see a baseball as we do because our reaction to it includes the responses for grasping, rolling, and throwing. If we view the matter genetically, we find that simple reds and greens and tones and smells are not simple at all. They are perceptions that we have acquired as the result of building up certain responses.

This, however, is only the beginning of an explanation. What the critic wants to know is, not how these perceptions were acquired, but what their nature is after we have got them. Are they mental facts or can they be reduced to something else? As a rule, behaviorists, with some exceptions, have not shown themselves greatly interested in this question. They have been inclined to take sense-perception for granted and to treat sense-qualities as objective, physical facts. We cannot do this, however, without giving some account of illusions and the variations that occur when different observers look at the same object or when the same observer looks at an object under different conditions. We cannot, without further ado, say that all the sense-qualities thus observed are "objective" and let it go at that.

When a difficulty of this kind is raised the behaviorist is likely to answer somewhat as follows. Modern physics teaches us that the things of the environment are not as different from one another as they seem. According to a view that has become popular among physicists in recent years the world of matter is made up of electrons and protons. Things differ from one another by the distribution and arrangement of these electrons and protons. "Substances differ from each other in their chemical and physical properties, to the extent that there are differences

in the spacial patterns and the dynamic orbits of the several electron-proton aggregates." [5]

Here, then, is our clue. To the physicist the difference between red and blue, or between red and a tone, is merely a difference " in the spacial patterns and the dynamic orbits of the several electron-proton aggregates." Let us now introduce our observer and assume that he reacts in a way which leads him to say, " I see blue." We have already ascertained that the objective stimulus is only a certain activity of electrons-protons. If we go on now and examine the reactions of the observer, we find that these likewise consist of such activities and nothing else, since the body, like every other form of matter, consists of electrons-protons. The reaction of the observer, as was said a moment ago, is an acquired response. Until a certain specific reaction has been built up, the observer is unable to discriminate the present color and give it a name. The point is, however, that when we have taken stock of all the activities concerned, *viz.*, the external stimulus and the bodily reactions, we have told the whole story. That is what we mean by blue. The quality, blue, is just a name for this assortment of activities.

" Blueness is not something in *addition* to these conditions. If the self-observer could designate all the anatomical and physiological factors that are involved, he would find merely a specific sensori-motor condition that is rather complex but always functions when acted upon by light of the specified frequency. . . . For the behaviorist the quality of blueness indicates the fact that the individual has developed a response that is specific for a spectral blue stimulus." [6]

[5] Weiss, A. P., *A Theoretical Basis of Human Behavior*, p. 19. R. G. Adams & Company.

[6] Weiss, A. P., *A Theoretical Basis of Human Behavior*, pp. 272, 273. R. G. Adams & Company.

In a word, the behaviorist applies the same sort of explanation to sense-qualities as that adopted in the physical sciences. If it is correct to say that sound consists of air-waves, that water consists of H_2O, and that diamonds consist of carbon, why may we not say that the quality blue consists of certain processes or activities? Moreover, this explanation accounts simply and conveniently for illusions and variations in sense-perception. These are all reducible to specific reactions. There is no mystery about it. In particular there is no need of introducing a consciousness to explain the facts. It would be just as reasonable for the chemist to bring in a consciousness in order to explain how water can be made up of hydrogen and oxygen. Water is not something over and above the hydrogen and oxygen, and similarly blue is not something over and above the sum of its conditions.

The same type of explanation obviously applies to images. We can close our eyes and call up scenes of the past or indulge in irresponsible daydreaming. There is no particular problem about this if we keep our eye on the fact that these images and memories consist of activities engaged in by the organism. We make certain responses, we act, and these activities are known as images.

With the reduction of sensations, perceptions, and images to activities or processes the behaviorist succeeds in reducing all the terms of his explanation to a simple common denominator. Everything that we call experience consists of physical reactions. It is not necessary at any point to have recourse to a different kind of reality called " mind " or " consciousness." Such terms as foresight, purpose, motive, desire, have no proper place in a psychological vocabulary. They are literary, not scien-

tific terms. We can explain everything that a human being does in the same terms with which we explain the operations of a machine.[7]

This behavioristic explanation of human behavior we must now attempt to trace in brief detail. The proper starting-point is the newborn infant. Previous to the occurrence of what we call experience, the infant is just a mass of protoplasm that is organized so as to respond in certain ways. These modes of response we call reflexes. As the name indicates, a reflex action has no relation to purpose; it is just as mechanical as the action of a shotgun or of a creeping ivy. Behaviorism is committed to the proposition that all human behavior can be reduced to terms of this kind. It insists that everything which is included under the name of learning can be explained in terms of reflexes.

According to behaviorism all learning is only a matter of building up new reflexes. This is done by coupling up stimuli with new responses so as to make new pairs. A reflex action which is created by joining a stimulus to a different response is called a "conditioned reflex." For example, if a sharp noise is made whenever a child reaches for a toy, the reaction of fear is set up, which causes the hand to be withdrawn. If this is done a number of times, the child will eventually withdraw the hand when the toy is shown, even if the noise is absent. The toy has then become a stimulus to withdrawal. Or if we say "dinner" every time we hand an infant his bottle, he will presently react for "bottle" whenever the word "dinner" is spoken, even if the bottle is not in sight. The only difference be-

[7] Weiss, A. P., *A Theoretical Basis of Human Behavior*, pp. 346–353. R. G. Adams & Company.

tween a conditioned reflex and an inborn reflex is a difference in origin. When a conditioned reflex has once been acquired, it is just like any other reflex. That is to say, all behavior, whether original or acquired, is of the reflex type, which means that it is essentially mechanical in character. We never get off the level of reflex action. There are, of course, all kinds of complications and integrations of the reflexes, but all that is only a matter of detail. Learning of every kind consists ultimately in the building up of conditioned reflexes.[8]

This "conditioning" of the nervous system explains the formation of "complexes," of which the psychoanalysts have made so great a mystery. Watson illustrates by what he calls "nest habits." A child is "spoiled" by having everything done for him by his mother. He must be fed, bathed, and dressed only by his mother, he must have his mother with him at all times, etc. The result is a "nest habit" which makes it almost impossible for the child in later life to break away from these ties. He — or perhaps more frequently she — may marry, but the old ties are too strong, and the marriage turns out a failure, because the life of the young person so brought up continues to center on the mother. The explanation, as Watson insists, is not to be looked for in terms of "subconscious needs" or in "repressions," but in the early conditioning of the nervous system. The child has learned to react in a certain way, and that is all.

This whole interpretation of learning has brought with it a striking change of front in the matter of instincts. At first the development of physiological psychology served

[8] Watson, J. B., *The Ways of Behaviorism*, pp. 31, 32. Harper & Brothers.

to give prominence to instincts. (See chapter VIII.) Given certain mental traits or tendencies, the facts of physiological, particularly embryonic, development were interpreted to mean that the influence of the environment was strictly secondary, and even that it was usually harmful. When the concept of "mental" is discarded altogether, as in behaviorism, the whole approach is different. According to Watson, the doctrine of instincts is just a hangover of the old dualism and has no place in a strictly scientific psychology. Behavior consists of native and conditioned reflexes and nothing else, and there is no need to speak of instincts at all. Human infants differ from one another at birth only in bodily structure, including chemical constitution. Within the limits set by structure, they are all alike, which means that environment or education becomes all-important. The notion that there are special aptitudes or inherited traits which qualify individuals for specific occupations, such as medicine, law, art, etc., is a myth. "The behaviorists believe there is nothing from within to develop. If you start with a healthy body, the right number of fingers and toes, eyes and the few elementary movements that are present at birth, you do not need anything else in the way of raw material to make a man, be that man a genius, a cultured gentleman, a rowdy or a thug."[9]

This explanation has an obvious educational significance. Learning is much more than merely "intellectual."

[9] Watson, J. B., *Psychological Care of Infant and Child,* p. 41. W. W. Norton & Co. *Cf. also* Watson, *Behaviorism,* chapter V, W. W. Norton & Co., and *The Ways of Behaviorism,* chapter II. Harper & Brothers.

It must be added that the behaviorists are not in agreement among themselves, on the question of original tendencies. Watson represents an extreme in his rejection of them.

Or, to put the matter into more acceptable behavioristic language, learning is not confined to the action of the striped muscles. The visceral reactions that control the life of emotion and sentiment are of primary importance. It is of little consequence to teach a child that certain forms of literature or art are beautiful or that certain actions are admirable unless these judgments are endorsed by the visceral responses of the child. There must be a responsive thrill, or the learning is just so much verbiage. These emotional reactions furnish the real standard of our judgments of value; they determine what we really care for and by what kinds of things we are to be motivated. Success and failure in life are not determined solely or perhaps even mainly by intellectual capacity. Perhaps the majority of failures may be traced back to emotional mal-adjustment, expressing itself in grouchiness, touchiness, lack of confidence, lack of persistence, neatness, dependableness, and the like. These are all matters of faulty emotional organization.

The nervous system faithfully stores away the conditioned reflexes that we acquire as we go along. It "remembers" the past. If we turn next to the consideration of other forms of learning, we find that the function of memory in learning presents a somewhat complicated problem. This is due to the fact that language reactions come in and play a peculiar rôle. Perhaps the best approach to the problem is to note that the term "memory" has a double meaning, depending on whether or not the language reaction is involved. We may learn to swim or skate at an early age and find, years later, that we still "remember" how to do these things. Memory in this sense means only that we retain the power to react to

certain stimuli in a certain way. The burnt child — or for that matter, the burnt pup — may "remember" the disagreeable experience in the sense that a permanent form of response has been acquired towards fire. There need be no memory in the sense that the particular occurrence is dwelt upon as in the case of reminiscence.

The other kind of memory is a very different matter. It locates events definitely in the past and it supplies them with a certain amount of context or setting. Thus we remember the hunting trip of ten years ago; how it rained, how the cow was mistaken for a deer, etc. This is unquestionably different from remembering how to swim. What is the nature of the difference?

According to the behaviorist, the difference is mainly or solely a difference in "verbalization." We may learn to swim without any process of verbalization. Ordinarily, however, our activities are all interwoven with verbalization, and this verbalization is what makes possible the kind of memory called reverie or reminiscence. The average adult is talking all the time during his waking hours and even in his dreams. Most of this talking is not audible, but takes the form of "implicit response" or "subvocal speech." It consists of muscular contractions in the lips, tongue, throat, and chest. Much of this verbalization may go on without any awareness on the part of the person concerned. Because of this tendency to verbalize, the things that we do get themselves expressed simultaneously in vocal or subvocal speech. A person reaching for a newspaper or disposing of an umbrella will say "pick up newspaper" or "put umbrella in corner" as the act is performed. Consequently the act which gets itself recorded in the nervous system is in part a verbal

response, and this verbal response, so we learn, is the key to our every-day remembering.

The explanation of how this comes about rests on the principle of physiological habit-formation. Let us suppose that a child copies a bit of verse in his notebook. He sees each word, writes it down, and verbalizes it, all at the same time. Consequently two neural organizations, the manual and the verbal, are built up simultaneously in connection with the visual stimulus. These two organizations are of course in more or less intimate relation with one another, since different processes going on in the nervous system at the same time tend to become interconnected, so that, if one of them recurs, it reinstates its former associates.

If an American were copying Chinese hieroglyphics, the verbalization would naturally proceed less smoothly. We cannot assume that no verbalization occurs, but it would be of a different kind. We would still tend to verbalize the symbols, as for example, " vertical-line-with-three-cross-pieces," or perhaps we would give the symbol some arbitrary name like " telegraph pole," and the like. It is conceivable, however, that a manual process, like copying, might be repeated so often that it could finally be performed " from memory," but without any help from language. We should need only to start the process by copying the first symbol, and the rest would follow, as sheep follow a leader. We get something like this in tennis playing. A good player makes skillful and complicated strokes, because his nervous system provides for certain correlations of eye, hand, and muscles. He knows how to make these strokes, but he may be quite unable to tell a novice how to reproduce them. The correlation got

itself built up without any concomitant verbal organization.

In a purely manual organization the repetition of the act depends on the power of each step in the process to call up its successor. On the other hand, if a parallel verbal organization has been built up, the proceedings become more complicated. The first step in the process has two associative links, one of these being the next step and the other the name for the first step. Let us suppose that a child starting to write down the alphabet gets a start by writing the letter *a*. This writing is connected with the verbalization *a*, and also with the next act, *viz.*, the writing of *b*. At the same time the verbalization *a* starts off another series. The verbal *a* is connected with the verbal *b* which in turn is connected with the manual act of writing *b*. Consequently the child after copying *a* may proceed to *b* in either of two ways. He may proceed directly through the manual series, from the writing of *a* to the writing of *b*, or he may reach *b* by a roundabout route, *viz.*, through the verbal *a* to the verbal *b* and hence to the manual *b*. In other words the writing of *a* is connected with the verbal *a*, and the verbal *a* then arouses the verbal *b*, which is connected with the writing of *b*. The verbal responses have got themselves built into the total acts so as to become a convenient medium for reinstating these former total acts.

When these verbal responses have thus become a part of the total responses, we can talk about what we have done by rehearsing the various steps. All we need to do is to reinstate the verbal process; this constitutes remembering. Consequently this form of remembering goes back only to events which were accompanied by verbali-

zation. We cannot remember things that happened before we learned to speak.

For some unexplained reason it is easier to repeat an act if we have verbalized it than it is to repeat independently of verbalization. It would be a tremendous job to learn to write the successive letters of the alphabet in correct order without the help of names. It is much easier, apparently, to associate the verbal *a* with the verbal *b* than to associate the manual *a* with the manual *b*. Consequently we tend to get from the manual *a* to the manual *b* through the verbal series. The longest way around is the shortest way home.

Here again we may pause for a moment to point to the educational moral of the tale, *viz.*, that it is very important to have children verbalize with reasonable care the things that they do in school. In our enthusiasm for "self-activity" and teaching by projects the importance of proper verbalization is easily overlooked. It is largely through verbalization that pupils gain the sort of control which enables them to use with facility what they have learned. We can readily understand and sympathize with the reaction against the extreme verbalization of the older type of pedagogy. But reactions are proverbially extreme. Language has a unique significance for education, and in our hostility to purely verbal learning we are in danger of pouring out the child with the bath.

Our next problem is the nature of thinking. This problem is attacked by the behaviorist in piecemeal fashion. First of all, as he points out, a great deal of what we call thinking is just a matter of manipulating habits. Who was the fifth President of the United States? We may never have encountered this question before. In order to

find the answer we rehearse the list of Presidents and count them as we go: Washington, Adams, Jefferson, Madison, Monroe. "The fifth President was James Monroe." We stop with Monroe because this is the "right" answer, *i.e.*, it is the answer which makes the stimulus cease to stimulate, in much the same way that a good meal removes the stimulus of hunger or the sight of his master sets at rest the uneasiness of a dog. The distinctive feature of the illustration here used is that it deals with language habits, in the sense that words are a substitute for other activities. Verbal organizations, however, are as much a matter of habit as any other. We call this particular use of verbal organization thinking because by thinking we mean those activities in which symbols are used as substitutes for other processes. More briefly, thinking, as Watson puts it, consists in talking to ourselves.

The foregoing illustration classes as a case of thinking, but it is not thinking of a very high order. It is mostly an exercise of memory. What explanation shall we give of "creative" thinking? Instead of tackling this question directly, let us first take a brief look at the learning of animals. This is worth doing because it suggests that this creativeness is more apparent than real. A dog, for example, may learn to open a garden gate by standing on his hind legs before the gate and pressing with his paw the latch that opens the gate. The weight of the dog pressing against the gate then swings the gate open and the dog gets out. To the innocent bystander this is very clever, but to the behavioristic psychologist it is exactly the same kind of thing as the formation of a conditioned reflex; it is, indeed, simply an illustration of it. The dog begins by

jumping up against the gate and clawing around indiscriminately when his master closes the gate after passing out so as to keep the dog from following him. As a result of this clawing around, the dog, at some lucky moment, presses the latch accidentally and gets out. The same situation recurs a number of times later on, and the irrelevant movements are gradually dropped out. Finally the time comes when the dog can open the gate without any random movement whatever. If we are unsophisticated, we shall then credit the dog with a superior " mind " or " intelligence," which directs his movements. There is no more intelligence about it than there is in the process by which a river overflows its banks and forms a new channel. The act by which the dog opens the gate is merely a combination of certain simpler acts, such as standing on his hind legs, leaning against the gate, and pressing down with his paw. These simple acts have become combined into a larger unit, a habit, in essentially the same way that any other conditioned reflex is formed.[10]

What is called creative thinking is reducible to the same kind of thing as animal learning, with the exception that such thinking is carried on in terms of verbal organizations. Animals fumble around with things until they hit upon the right reaction or until they grow tired and stop. Human beings, when confronted with mechanical puzzles, do the same thing, except that a part of the fumbling may be done with verbal organizations, which serve as substitutes for things. The human subject in an experiment of this kind is likely to talk to himself all the while, either audibly or subvocally. The gate is to be

[10] The learning of animals is discussed more in detail in the next chapter.

opened, — "lift it off its hinges," "release the latch," "pry it open with a lever," etc. That is, the situation which requires the opening of the gate sets off all sorts of verbal organizations that have been built up previously. We have built up such organizations for hinges, latches, and the like, and now use them. Thus we have built up verbal responses for hinges, such as oiling, swinging, and lifting off, and the fact that we "think" of "lifting off the hinges" instead of "oiling" in the present situation is determined by physiological laws of association and not by a mysterious something called "intelligence." The fact that one verbal response rather than another comes into play constitutes what we call analyzing the situation. The lower animals by comparison fumble around with the object as an undifferentiated total object. Human beings can attack the problem more in detail, thanks to these verbal organizations. But in either case the solution of the problem consists in combining previous conditioned reflexes or habits into a new pattern.

The same explanation applies when we solve a problem in a "purely inward" fashion, *i.e.*, when we rely entirely on verbal organizations. Thus someone may invite us to go on an excursion. This sets off a variety of verbal responses. Perhaps the suggestion is attractive. It means a long ride, fishing, camping in the woods, etc. But counter "considerations" soon emerge. The outing will be expensive, work is pressing at the office, certain appointments could not be kept. We fumble around with the responses thus released much as the dog fumbles with the gate. Presently a "solution" perhaps appears. The excursion can be changed as to time and character so as to remove the difficulties. Or no solution

appears and we give it up; we "decide" not to go. In either case the process remains wholly on a mechanical level, without the intervention of an extraneous "mind."

The foregoing discussion indicates, in very brief outline, the manner in which behaviorism undertakes to explain human behavior. The chief purpose of this account is to show that the behavioristic movement in psychology is not merely an irresponsible revolt against traditional doctrine, but that it has considerable justification, both in the intolerable difficulties and obscurities connected with the dualism of mind and body and in the plausibility of the explanations which it proposes as a substitute for those which it rejects. Behavioristic psychology obviously is of great significance for our interpretation of the learning process. If behaviorism is true, our educational practice must be revised from the ground up. What behaviorism means for education will be considered more at length in the next chapter.

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CHAPTER X

THE LEARNING PROCESS FROM THE STAND-POINT OF BEHAVIORISM

In the preceding chapters we have traced the process by which the development of physiological psychology led into behaviorism. It is to be expected that a development of this kind would have an extensive influence on educational theory. This influence became evident long before the development had culminated in the behavioristic psychology of the present day.

How this came about is easily pointed out. The study of the body in its relation to the facts of psychology naturally emphasized such matters as instincts, tendencies, and impulses. In earlier times these things were mainly disregarded. Thus the disposition of the child to play, to draw and paint and construct things, was usually treated as more or less of a nuisance, since it interfered with the high purpose of making the child learn the things which were in the book and which he would need for the affairs of adult life. At best this disposition was regarded as due to frivolity and irresponsibility; very often it was classed as evidence of inherent depravity. The business of education was not to exploit this disposition so as to make it contribute to mental development, but to ignore and perhaps even to suppress it.

When we deal with childhood from the point of view of physiological psychology, however, the matter tends to

assume a very different aspect. We have learned to think of the child as an organism full of explosive energy, which is set off by the solicitations of the environment in somewhat the same way that a firecracker is set off by a match. The infant comes into the world with the capacity or tendency to react in various typical ways, which we call by such names as fear, rage, curiosity, vocalization, reaching, grasping, and the like. These forms of reaction have no inherent moral quality whatever; they are simply indications of bodily organization, like the reactions involved in breathing and digestion. But they are the raw material out of which the moral and intellectual life of the individual is fashioned. Thus vocalization must be made over into civilized speech; fear, hate, curiosity, and admiration must be modified and re-directed; the disposition to handle things must become the basis for skill with tools and a knowledge of materials, and so on. One of the characteristic traits of modern education is the insistence that teaching must take its point of departure from these native tendencies, or capacities, of childhood.

This shift of emphasis, however, was preceded by the shift from the soul-substance theory to the conception of mind as "consciousness" or mental states. Consequently, so long as this latter conception prevailed, the center of educational theory and practice could not be located in the native tendencies of the body, but in the grouping or organizing of the experiences or impressions which come in by way of the sense-organs. In other words, the substitution of mental states for the soul substance left us with the idea that we *first* receive impressions and *then* proceed to do something about it. The pupil at the outset is passive. In terms of the Herbartian

Five Steps, the teacher must first arouse or revive certain of the pupil's earlier experiences (the step of Preparation), and then must add certain new material (the step of Presentation). The remaining steps then necessarily follow in their appointed order. No matter how much the Herbartians may talk about self-activity, the starting point is a condition of passivity, because the pupil is supposed to operate with a certain material called sensations or impressions. Teaching then becomes a matter of following a certain fixed order of steps, more or less as a cook follows a recipe. Consequently the advantage of recognizing interest and the need of psychological organization was largely lost.

> "The interests actually utilized by the teacher are the interests which children possess in common, and the apperceptive systems which the teachers conceive as basic in moving from the known to the unknown are confined to what was learned in the 'last lesson.' In this system the more conscientious the teacher the greater is the temptation to stifle the genuine activity of the child and to shape it in the image of adult ideals. The child becomes as putty in the hands of a workman. In the teacher's desire to bring forth a worthy product, the child's individuality and initiative and spontaneity are lost sight of." [1]

As Dewey remarks, "it would seem as if five minutes' unprejudiced observation of the way an infant gains knowledge would have sufficed to overthrow the notion that he is passively engaged in receiving impressions of isolated ready-made qualities of sound, color, loudness, etc." [2] The notion of passive receptivity is open to pro-

[1] Thayer, V. T., *The Passing of the Recitation,* p. 23. D. C. Heath and Company.

[2] Dewey, J., *Democracy and Education,* p. 317. The Macmillan Company.

found suspicion. The same is true of the methodology that is based on this notion. When we look at learning as a process that is engaged in by the pupil, the whole perspective changes. In that case no one can tell in advance what difficulties will be met or what detours will have to be made in order to reach the goal. From this point of view the whole undertaking is thoroughly experimental in character. Difficulties must be dealt with as they arise; there can be no fixed order of steps. The teacher must know how to take his cue from the pupil. Instead of adapting the pupil to the teaching procedure, the teaching procedure must be adapted to the pupil. Learning becomes a creative process, and it is futile to try to block out all the steps in advance.

In brief, then, the trouble with Herbartianism is that the doctrine of mental states resulted in a fundamental misconception of the learning process. "The fundamental theoretical defect of this view," as Dewey points out, "lies in ignoring the existence in a living being of active and specific functions which are developed in the re-direction and combination which occur as they are occupied with their environment." [3] Herbartianism assigned the center of the stage to the teacher rather than the pupil. It represented a long step in advance in that it rejected faculty psychology and emphasized the importance of subject matter and of teaching procedure. But it did not escape from the notion that the pupil is primarily a repository of learning. "It takes, in brief, everything educational into account save its essence, — vital energy seeking opportunity for effective exercise. All education

[3] Dewey, J., *Democracy and Education,* p. 83. The Macmillan Company.

forms character, mental and moral, but formation consists in the selection and coördination of native activities so that they may utilize the subject matter of the environment." [4]

The reason why Herbartianism, and, indeed, the whole educational movement that took its point of departure from a psychology of mental states, was more or less of a disappointment is that it perpetuated the original dualism of mind and body. Consequently, it was unable to profit as extensively as it should by its emancipation from the limitations of a purely classical curriculum. The utilization of a wider range of subject matter provided no escape from the notion that the child is "as putty in the hands of a workman." If, by contrast, we start with the notion of "vital energy seeking opportunity for effective exercise," the whole perspective changes. Vocation then may become the medium for the liberation of intellectual, social, and artistic capacity, and the oppositions between vocation and culture or duty and interest tend to disappear. The organization of subject matter is then determined by what is needed for the release of native energy and capacity. On the other hand, if it lies with the teacher to determine the selection of the subject matter and to direct every step in the process of organization, then the tendency is to encourage, not creativeness or pupil initiative, but conformity to preordained patterns. As Dewey has pointed out,[5] the old dualisms in education — culture and vocation, the intellectual and the practical, duty and interest, and the like, — managed to per-

[4] *Ibid.*, p. 84.
[5] Dewey, J., *Democracy and Education*, especially chapters XIX–XXII. The Macmillan Company.

sist as obstacles to effective education because the old dualism of mind and body was retained. In the end, therefore, this newer educational movement, like formal discipline, became the ally of traditionalism.

An illustration of the oppositions created by the historic notion of mind is furnished by the discussions of interest. If the mind is a detached thing, interest comes to mean the excitation of feelings of pleasure or pain in order to give importance to something that otherwise would fail to hold the attention. In so far as education is based on this conception of interest, it degenerates into "soft pedagogy." As a corrective of this tendency we then get an equally artificial notion of "duty." Man is regarded as the prey of natural selfishness, against which he can be protected only by being trained into submissiveness to duty. The point is that duty is viewed as something foreign to his original nature and that moral conduct is made to consist in conformity to an extraneous authority.[6] The possibility that the sense of duty may be an expression of the individual's deeper or more inclusive interests is disregarded if we do not take as our point of departure the fact that man is first of all an active being and that our specific impulses or desires must be modified with reference to one another so as to secure a maximum of self-expression. If we make our approach from this

[6] Some subjects or pursuits are "made necessary by the conditions of civilized life. The powers required in them may be very alien to our 'natural' or more nearly instinctive life, may be very artificial, in fact — the artificial requirements of the culture, moral behavior, and vocational proficiency imposed by civilization." Snedden, D., *Sociological Determination of Objectives in Education,* p. 74. Lippincott. — Since these subjects are alien to our nature, it is proposed that they be treated as "hard work" subjects, which can have no inherent appeals to our perverse and sinful flesh.

angle, interest and duty go hand in hand and the original opposition disappears.

The psychology of behaviorism, as we have seen, offers a very simple remedy for such troubles as grow out of the Herbartian psychology. Herbartianism is so preoccupied with "consciousness" that it neglects the body. This preoccupation naturally throws everything out of focus, and the situation calls for a drastic remedy. According to behaviorism, consciousness is a fictitious entity and therefore superfluous; human conduct can be explained adequately without reference to any such categories as "mind," "purpose," or "meaning." These are all relics of the old dualism, which has bequeathed to us the doctrine of mental states. This dualism has demonstrated its futility. Behaviorism proposes to wipe the slate clean and take a new start. All learning is to be explained in terms of conditioned reflexes.

This interesting program must now be examined in more detail. As a point of departure we may take the pioneer work done by Thorndike in the field of animal learning. Some of this work consisted in experiments with cats in order to observe how they learned to escape from a box or cage. A cat was placed in a cage after it had been deprived of food for some considerable time. Food was placed outside of the cage, where it could be seen through the bars, but at a distance where it could not be reached by the cat. The animal would then struggle in the usual cat fashion to get at the food. It would reach through the bars, try to squeeze through them, and claw around promiscuously. The purpose of these experiments was to find out how long it would take the cat to learn to do a certain thing, such as pulling a string,

turning a button, or pressing a lever, which would release it from the cage.

These experiments furnish some interesting results. Since the cat had no knowledge of the mechanism by which the release could be effected, it could at first escape from the cage only by accident. In the course of its struggles the cat would eventually hit by chance upon the thing that had to be done, in order to open the door of the cage. For example, it would just happen to pull a string suspended in the cage, which would then open the door so that the cat could get out. What made the experiment interesting was the fact that the cat evidently did not "catch on" to the meaning of the string. This was made clear by what happened in subsequent experiments. When the experiment was repeated, the cat would not go straight to the string, as we would expect a human being to do, but would claw around in a more or less random fashion as before. In other words, the successful outcome was again dependent on accident. With the repetition of the experiment, however, the time necessary for opening the door of the cage was gradually shortened. The number of wrong responses was gradually decreased, which meant that the cat was in process of building up an association between the situation of "being in the cage" and performing the action of pulling a string. In the end the cat was able to do the right thing as soon as it was placed in the box. In ordinary parlance, the cat had learned how to get out of the cage.

The significant feature of this experiment is that we seem to be dealing with a very specific kind of learning. It is learning without the element of "catching on" to the meaning of the string. The learning is just a process

of fixing certain reactions, as we do in learning to play tennis or to run a typewriter. According to Thorndike, it is just a process of building up a conditioned reflex. If we consider the manner in which the time interval between being placed in the cage and escaping from the cage is shortened, we find that the facts give some color to this interpretation. "Thus the successive times taken by one cat in a certain box were (in seconds) 160, 30, 90, 60, 15, 28, 20, 30, 22, 11, 15, 20, 12, 10, 14, 8, 5, 10, 8, 6, 6, 7."[7] If we plot a curve for these figures, we find, indeed, considerable irregularity, but we also find a general, unmistakable slope downwards. There is no sudden drop, as might be expected if the animal had discovered, by a flash of insight, that the string was a means of escaping from the cage. The gradual descent of the slope indicates that, for some reason, the wrong responses tend progressively to drop out, until finally the tendency to do just one thing is firmly established in the nervous system of the cat.

It seems reasonable to suppose that if the cat had perceived the causal connection between pulling the string and escaping from the cage, the time expended on the third trial would not have run to ninety seconds. The record indicates that the cat was not "learning" anything, in the sense of gaining an understanding of causal connections. It had no more insight at the end of the process than at the beginning. The final reaction, like the original reflexes, was as devoid of understanding or purpose as the act of withdrawing the hand when it comes into contact with a hot stove. This is Thorndike's doc-

[7] *Psychological Review,* Vol. 5, p. 552. Quoted by Stout, G. F., *Manual of Psychology,* p. 262. Noble and Noble.

trine. In his view, this process of learning is merely a matter of establishing a new neural pathway, so that the stimulus eventually produces just one reaction, to the exclusion of all others. The reaction or response which opens the door of the cage has become definitely associated with a particular stimulus.

The explanation to be given of this learning may take either or both of two forms: It may be pointed out, as Watson [8] does, that the cat does the right thing each time that it gets out of the cage; it also does a number of wrong things, but it does not do the same wrong things on each of the different occasions. In other words, the right thing is done oftener than any one of the wrong things; consequently, by the law of habit, a tendency is established in favor of the right thing. Or we may say, with Thorndike,[9] that doing the right thing results in pleasure or satisfaction, and that acts which result in satisfaction have a tendency, in some obscure way, to gain predominance. They become "stamped in," as a consequence of the resulting pleasure, and so are repeated more easily. The point is that both of these explanations for learning of this kind go back to physiological habit, without recourse to any guidance by "insight," for which there is no room in a behavioristic program. As a result of repetition the wrong movements are gradually eliminated and the right actions are retained. This is the whole story. It means that the right response has been reduced to the type of reflex.

If, now, we turn to learning as it takes place in men, we

[8] Watson, J. B., *Behaviorism,* pp. 164–166. The People's Institute Publishing Company.

[9] Thorndike, E. L., *Educational Psychology* (Briefer Course), Chap. IV and p. 172. Teachers' College.

seem to find a great difference. Whatever we may say of the lower animals, human beings seem to exercise intelligence, and it is not apparent how their behavior is to be explained in terms of simple habit formation, as in the case of cats or other animals. On the surface, at any rate, there is a tremendous difference, and this difference lies in the fact that human beings have the power of abstract thinking. They can analyze a situation and figure out what is important or what needs to be done, for the purpose of getting the results that are desired. In other words, they can cut out the random movements and the wearisome repetitions almost entirely, and pick out the right act at once, because they are endowed with understanding or insight. Consequently the learning of human beings seems to be something more than mere habit formation of the kind just described. However we may see fit to explain animal learning, it seems clear that human learning is directed by ideas and purposes which raise it far above the level of mechanical habit.

That there is a difference of some kind is recognized by Thorndike when he points out that animal learning of the kind previously discussed

"is characterized negatively by the absence of inferential, ratiocinative thinking; and indeed by the absence of effective use of 'ideas' of any sort. Were the reader confined in a maze or cage, or left at some distance from home, his responses to those situations would almost certainly include many ideas, judgments or thoughts about the situation; and his acts would probably in large measure be led up to or 'mediated' by such sequences of ideas as are commonly called reasoning. Between the annoying situation and the response which relieves the annoyance there might for the reader well intervene an hour of inner consideration, thought, planning and the like. But there is no evidence that any ideas

about the maze, the cage, the food, or anything else, were present to determine the acts of the chicks or kittens in question. Their responses were made directly to the situations as sensed, not *via* ideas suggested by it." [10]

The recognition of this difference between animal and human learning suggests that it is necessary to give only a limited scope to the behavioristic doctrine that all learning is reducible to the type of the conditioned reflex. But if we impose this limitation on our explanation, we seem forced to return to the ancient dualism of mind and matter, to which Thorndike is very much averse. While he has never classed himself as a behaviorist in psychology, he is at one with the behaviorist in his insistence that all conduct, whether animal or human, is fundamentally a matter of acquiring conditioned reflexes. As he says:

"If any learned response is made to the situation — if anything is done over and above what man's original nature provides — it is due to the action of use, disuse, satisfaction and discomfort. There is no arbitrary hocus pocus whereby man's nature acts in an unpredictable spasm when he is confronted with a new situation. His habits do not then retire to some convenient distance while some new and mysterious entities direct his behavior. On the contrary, nowhere are the bonds acquired with old situations more surely revealed in action than when a new situation appears. The child in the presence of a new object, the savage with a new implement, manufacturers making steam coaches or motor cars, the school boy beginning algebra, the foreigner pronouncing English — in all such cases old acquisitions are, together with original tendencies, the obvious determiners of response, exemplifying the law stated above." [11]

[10] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 131. Teachers' College.

[11] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 149. Teachers' College.

The import of this view is, apparently, that human reasoning is at bottom simply a more complicated instance of what happens when the cat " learns " to get out of the cage. Human behavior differs in that it involves " such sequences of ideas as are called reasoning." The human being has capacity for " inner consideration, thought, planning, and the like." In Thorndike's view, however, ideas or reasoning present nothing that is essentially new; and so our next task must be to trace the explanation by which ideas and reasoning are reduced to the form of conditioned reflexes.

Our point of departure here lies in the fact that human beings are far superior to the lower animals in the capacity to respond to the elements of a complex situation separately and in detail. Analysis is a plant of slow growth. We tend to deal with situations as gross, undefined wholes and only gradually learn to pick out their salient features. To the baby, in James's vivid phraseology, the environment presents itself as a great, big, blooming, buzzing confusion; and it is not entirely clear to what extent the lower animals ever escape from this level. To be sure, they recognize differences among things, just as we may be able to say that the manner of one person is more friendly or more sincere than that of another. But we may experience the difference without being able to say why or how; each total situation has a unique " feel " or quality which marks it off from others. In human experience, however, these gross total situations may break up into elements which can be dealt with separately. This breaking up of situations eventually becomes the source of " ideas " and of those processes which we call reasoning.

"Man's intellectual supremacy is due to the fact that he is able to isolate and respond to elements which for the lower animals remain inextricably imbedded in gross total situations. The furniture, conversation, or behavior which to a dog are an undefined impression (such as the reader would have from looking at an unfamiliar landscape upside down or hearing a babel of Chinese speeches, or being submerged ten feet under water for the first time, or being half awakened in an unfamiliar room by an earthquake), become to man intelligible aggregates of separate 'things,' 'words,' or 'acts,' further defined and constituted by color, number, size, shape, loudness, and the many elements which man analyzes out of the gross total situations of life for individual response." [12]

The things which are thus analyzed out of the "gross total situations of life" are of two kinds. Some of them, like articles of furniture, are physical components of certain situations, but are not dependent on those situations for their existence. Furniture can easily be shipped from one place to another. Other elements, however, such as number, size, shape, and loudness, are *abstractions,* by which is meant that they cannot be physically lifted out of one situation and transferred to another. It is quite possible to carry away a chair and leave the room behind; it is not possible to carry away the shape or the size of the chair and leave the chair behind. But we can consider the size or shape of the chair as readily as we can consider the chair itself or the room in which the chair is placed. That is, we can react to those abstract qualities more or less independently of the other qualities. But this is only because we have powers of response which the lower animals apparently do not have. The evidence in the case indicates that animals cannot isolate these qualities as humans can. In Thorndike's language, "an

[12] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 141. Teachers' College.

element which never exists by itself in nature can influence man almost as if it did so exist, bonds being formed with it that act almost or quite irrespective of the gross total situation in which it inheres." [13]

This ability to react to aspects or traits of things is the source of our abstract ideas. The given account of the process by which these ideas are formed is interesting and important. As an instance, let us take the idea of "triangle." The triangular shape is associated with all sorts of things — with lines on the blackboard, harps, wedges, buildings and building lots, and even with the "eternal triangle" of love affairs. Just because the shape appears in so many different settings or contexts, these latter tend eventually to drop out. This tendency is due to what James calls "dissociation by varying concomitants." Since the shape occurs with so many different concomitants, it is but loosely associated with all of them. The associates get into one another's way, so to speak, whenever the word triangle is mentioned. They gradually drop out, and in the end the reaction to "triangle" functions independently. When this result is achieved, we are said to have the idea of triangle. This process of learning, it will be observed, differs in no essential respect from that by which the cat learns to get out of the cage.

It is true that there is a great apparent difference between the flexibility of thinking and the routine character of habit. This difference, however, is accounted for if we keep our eye on the fact that our responses are not simply to "gross total situations" but to elements of the situation as well. Superficially an achievement like Newton's discovery of the law of gravitation appears, indeed, as a

[13] *Ibid.*, p. 161.

wide departure from the domain of habit. Closer scrutiny, however, shows that it was, in fact, simply an exemplification of the law of habit. According to the familiar story, the falling of an apple suggested to Newton that the moon likewise is a falling body. The path of the moon around the earth, indeed, is circular and not a straight line, like the path of a falling body. A circular motion, however, is analyzed by mathematicians into two components, a centrifugal motion and a centripetal motion. The latter, in the case of the moon, is a straight line towards the earth, exactly like the path of the falling apple. When Newton suspected the moon of being a falling body, he did not react to the "gross total situation," but towards one abstract element of the situation, *viz.*, the centripetal motion of the moon. In doing this, he simply transferred to his perception of the moon a habit which he had formed in connection with falling bodies on the surface of the earth. The application of a habit in this fashion may classify as a stroke of genius, but it is habit all the same.

This explanation has an engaging simplicity. Learning in the case of the lower animals consists in building up a certain response to a certain kind of situation. The right response is retained while the others gradually drop out, through the operation of mechanical causes. On the human level we seem to be confronted with a different situation, since the human mind can analyze and can distinguish between the important and the unimportant. But this difference between humans and the lower animals is more apparent than real. When we look more closely, we find that the process in the two cases is essentially the same. Human beings have a much greater capacity for

reacting to *elements* in a situation, but this introduces nothing that is essentially new. When a man "reasons out" a problem, he is simply reacting to such elements, instead of reacting to "gross total situations." He can deal with new and strange situations, just because he detects elements in them which are not at all new, but old and familiar. Thus a dog that has learned to open a gate by pressing a lever will be completely "stumped" by the substitution of a sliding bolt. A change of this kind would not keep an average human being for more than a few moments from opening the gate. He would detect the essential identity in the two cases, *viz.*, removal of the bolt or latch from its groove. This ability to react to abstract qualities is what has given to man his mastery over the material environment. We can fly in airplanes, because we have discovered that air is a fluid like water; we can build steam engines because we have discovered that steam exerts a push. All such discoveries rest on the ability to react to abstract qualities. "The insights of a gifted thinker seem marvelous to us because the subtle elements which are prepotent for his thought elude us." [14]

As the foregoing quotation indicates, Thorndike is disposed to make free use of the terminology of dualism. He does not hesitate to speak of "insight" and "thought," or to make reference to "ideas," "satisfaction," "annoyance," etc., without taking pains to explain just what is meant by such terms. On some occasions his language creates the impression that he believes in mental states. Thus he explains that the difference between the reactions of an animal finding its way out of a maze and the re-

[14] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 170. Teachers' College.

actions of a child trying to solve a problem in arithmetic is due to the fact that the reactions of the child " include ideas as components." [15] This *sounds* like saying that certain physical responses call forth mental states, which in turn are the cause of further physical responses, just as is taught by interactionism. But it is reasonably certain that Thorndike means nothing of this kind. The term " ideas " is only a convenient, not to say lazy, designation of certain physical responses. The tenor of Thorndike's whole doctrine is to the effect that to react to an abstract or " subtle " element in a situation is to have an idea. What we call insight is just a matter of responding to some element in the situation that happens to be important for the particular occasion. " Insight," along with everything else, is reducible to physical response and comes under the general principle of habit formation. Thorndike will have no commerce with dualism, since dualism is a doctrine by which it is " asserted, or at least hinted, that ' the will,' ' the voluntary attention,' ' the consciousness of the problem,' and other such entities are endowed with magic power to decide what is the ' right ' or ' useful ' bond and to kill off the others." [16]

As applied to the explanation of transfer of training, Thorndike's position results in the familiar doctrine of " identical elements." What is called transfer is in reality nothing but a repetition, in a new situation, of something that we have learned to do before. In Thorndike's language:

" One mental function or activity improves others in so far as and because they are in part identical with it, because it contains elements common to them. Addition improves multiplication be-

[15] *Ibid.*, p. 140. [16] *Ibid.*, p. 171.

cause multiplication is largely addition; knowledge of Latin gives increased ability to learn French because many of the facts learned in the one case are needed in the other. The study of geometry may lead a pupil to be more logical in all respects, for one element of being logical in all respects is to realize that facts can be absolutely proven and to admire and desire this certain and unquestionable sort of demonstration. . . .

"These identical elements may be in the stuff, the data concerned in the training, or in the attitude, the method taken with it. The former kind may be called *identities of substance* and the latter *identities of procedure*." [17]

This is but an elaborate way of saying that there is no such thing as transfer. If we learn to add 6 and 7, this accomplishment will be useful, of course, if we have to add 6 and 7 in a problem of multiplication. But there is no transfer about it. We simply do over again, without change, what we have learned to do before. While Thorndike does not say so explicitly, the implication of his doctrine is that the same is true when we have to do with "identity of procedure." A connection, an S-R bond, is already present in the nervous system, and so we respond as we did on some previous occasion. No matter how ingenious a person may be in modifying his behavior so as to suit new conditions, the final explanation of what he does must be rendered in terms of these mechanical S-R bonds.

The import of the discussion, up to this point, is that, for practical purposes, Thorndike's procedure is identical with that of the behaviorists. Thorndike makes his explanation of thought processes more difficult to follow by rather neglecting the function of language responses; and

[17] Thorndike, E. L., *Educational Psychology* (Briefer Course), pp. 276, 277. Teachers' College.

his use of dualistic terminology, particularly with reference to "satisfaction" and "annoyance," is not altogether excusable. Differences of this kind, however, should not be permitted to obscure the fact that for Thorndike, as for the behaviorists, the whole process of learning centers essentially on the building up of conditioned reflexes.[18]

This doctrine of learning has the merit of simplicity. If we adhere closely to this point of view we come upon certain implications that are rather startling. As Watson has explained, our appreciations are determined by visceral reactions, and these reactions can be conditioned like any other reactions. We like certain things and dislike others because we have built up certain reactions to them. Given the right conditions, a child can be made to react with an emotional thrill to any kind of object, such as a lead pencil or a handkerchief, or these objects can be made to arouse feelings of aversion. That is, our appreciations are determined in the main by the accidents of conditioning. Certain forms of art or of literature are labelled "great," and certain social institutions and customs, such as property, monogamy, truth-telling, etc., are held to be desirable and perhaps even sacred, for no better reason than that we were conditioned from early childhood to this end. We talk much about "progress," but we fail to see that progress is a name for whatever we happen to like. The savage, being conditioned differently, has his own standards of progress, and there is no way of proving that he is wrong. The visceral reactions are a law unto

[18] For an illustration of the tendency to make habit the basic thing in insight see Thorndike, E. L., *The Psychology of Algebra,* Chapter VIII. The Macmillan Company.

themselves. *De gustibus non est disputandum;* or, in more modern phrase, all love is blind.

What actually happens in our educational procedure is that we make pupils conform to the standards of the group. We make them like these standards, but at the same time we create the impression that our standards are intrinsically better than those of others. For example, we not only learn to prefer democracy to autocracy, but we may even engage in war so that the whole world may be made safe for democracy. The incentive toward reform and missionary zeal generally springs from the delusion that there is such a thing as an objective good.

It would be possible to extend this argument from the notion of "good" to the notion of "truth." The behaviorist tries to make us believe that what he says is true, when he is only showing that he talks as he does because he has been conditioned that way. If we are really like Thorndike's cats, there is no sense in talking about truth and error at all. A cat — or a cash register — is right or wrong only from the point of view of an outside observer. If we go on and apply the same interpretation to the observer himself, what becomes of truth and error? It would seem that there must be something wrong somewhere.

The argument concerning truth and error is perhaps too academic to be pressed here. It is more to the point to note the fact that in the end the educational implications of behaviorism bear a curious resemblance to the pedagogy of Herbart. This is in accord with the saying that the emphasis falls on the teacher rather than on the pupil. The teacher occupies the center of the stage. It is the teacher's business to organize and integrate the mental

states of the pupil, and the pupil is by comparison a passive receptacle. With the development of physiological psychology there was a reasonable prospect that the pupil would become the center of interest, in the sense that educational processes would be so organized as to release and direct the native capacities of the pupils. There has, in fact, been a growing recognition that the pupil is first of all a source of activity which takes the form of inquiry and experimentation so as to gain control over his environment. Consequently there is a strong movement in education to emphasize initiative and creative activity.

This movement, however, owes little to the psychology of behaviorism. In behaviorism our concern is altogether with the task of connecting certain responses with certain stimuli. The pupil is just so much raw material awaiting the manipulation of the teacher. There is an inevitable shift of emphasis away from "psychological" organization of subject matter, because the preoccupation of the teacher is not with the conditions that will stimulate the pupil to creative work in reorganizing and reinterpreting his world, but rather with the conditions that will ensure certain specific responses. And if this is the case, then, as Thayer pertinently inquires, "are not the conditions of habit formation a matter primarily of external control and education, to be conceived of as in this sense essentially a passive affair in which the teacher, or some phase of the world external to the child, exercises the determining function? Have we not ended, as we began, with what are substantially the views of Locke and of Herbart?"[19]

In brief, then, Thorndike makes habit the fundamental

[19] Thayer, V. T., *The Passing of the Recitation,* p. 98. D. C. Heath and Company.

category in animal learning, and then extends this interpretation to human learning, since concept formation introduces nothing which may be considered new. Educationally this appears to be merely a shift from one formalism to another. On the surface, at any rate, the initiative and spontaneity for which Herbart failed to provide are quite as unwelcome in behavioristic psychology. In other words, we find no recognition of mind or purpose or intelligence as a distinctive mode of behavior. Whether it is possible to provide a place for intelligence as a distinctive mode of behavior is a matter for consideration at a later time. Our present purpose is simply to make clear that habit formation is the ultimate category in Thorndike's theory of the learning process. On this point he allies himself with the behaviorists.

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CHAPTER XI

THE PROBLEM OF PURPOSIVE BEHAVIOR

We are constantly being assured in high places that there is no significant difference between the behavior of a human being and the behavior of a machine. Such differences as we do find are mainly differences of complexity. They are the same sort of differences that we find when we compare a wheelbarrow with an automobile. Man credits himself with purposes or intentions, but these are all reducible to principles of mechanism. Man is a machine.

It goes without saying that this conclusion is repugnant to common sense. This fact, however, is not in itself conclusive. What is called common sense may be nothing more than a name for prejudices to which we have become accustomed. The belief in a " mind " or " consciousness " may fairly claim to have the endorsement of common sense, yet this belief loses its title to acceptance in the face of the evidence. Consequently, it behooves us to give careful consideration to the contention that all human behavior is reducible to terms of mechanism.

We may begin our inquiry by asking what is meant by mechanism or mechanical action. The term is not easy to define, but for present purposes it suffices to define in negative terms by saying that mechanism means absence of purpose or aim. To say that an action is mechanical is to say that no foresight or aim figures in the

result. A cyclone, for example, uproots trees, but the movements of the air currents do not specifically arrange or adapt themselves so as to uproot trees. The wind just blows, and this is bad for trees if they happen to get in the way. Dynamite will likewise uproot trees, but if there is any purpose involved, the purpose lies in the man who placed the dynamite at the root of the tree. The dynamite itself is as innocent of purpose as the cyclone. The question for our consideration is whether the act of the man in placing the dynamite where it will blow up the tree is the same sort of activity as that of the dynamite itself or as that of the cyclone. Common sense says the man did it "on purpose," and that his act is therefore different from that of the cyclone. But if the "purpose" is just a form of motion, this view is a mistake. What we call the man's purpose is merely an indication that a certain activity is taking place, just as the noise made by the cyclone is an indication that trees are being uprooted. No place is left for a form of behavior in which the order or sequence of activities is determined by the result that is to be brought about.

Scientists in general are suspicious of words like "purpose," "aim," or "teleology." They are afraid that such terms will be made a cover for introducing into the occurrence an outside agency, like mind or spirit or mental states. They have become "gun-shy," to use a sporting term, and so they stick as closely as possible to mechanical interpretations. This is understandable, but it is possible that this aversion to purpose will lead to errors as great as those which we seek to avoid.

In educational psychology the question is of extreme importance. If purposive behavior is different from me-

chanical behavior, it is necessary to know just how it differs in order that educational practice may take account of the difference and cultivate those traits which are distinctive of intelligent behavior so as to make intelligent behavior more intelligent. For example, if thinking is different from mechanical behavior, then a knowledge of how thinking goes on will help to make thinking more effective than it was before.

Let us first review the situation briefly. The simplest forms of human behavior are usually classed as reflexes. As Thorndike says, human beings come into the world with a certain set of inborn tendencies or " bonds." With regard to these tendencies, there is no question of any controlling ends or purposes. The acts resulting from these innate bonds occur in much the same way that the acts performed by a cyclone take place. We do not usually wink in order to keep foreign substances out of the eye; there is no intent of any sort in the act. We wink because the eye " just naturally " closes under certain conditions. The eye closes as the door closes when the spring pulls on it, or when the wind blows it shut.

Reflex acts being thus accounted for, it is tempting to explain instinctive and intelligent behavior as consisting of a combination of reflexes. From this point of view, the behavior of a beaver in building a dam is explained by saying that the environment releases a number of reflexes in succession. First the beaver walks up to a tree, then he proceeds to cut the tree into certain lengths, then he rolls the pieces to the river; and so on until the entire operation is completed. Each of these acts comes in its turn, because the completion of one act becomes the stimulus to the next. That is, the difference between reflex

and instinctive behavior is just a difference of complexity. An instinctive act consists of various reflexes linked up in a series.

Having gone so far, the way seems open to take the last remaining step, which is to apply the same principle of explanation to behavior which we ordinarily call purposive or intelligent. If the complicated responses which take place in instinctive behavior are reducible to reflexes, it is only a prejudice to deny the antecedent possibility that all behavior is thus reducible. The facts must decide. According to the view that all behavior is reducible to reflexes, the environment merely releases the potential energies of the reflexes, just as a spark releases the energy stored up in powder. The energy of the living body simply explodes along certain pre-appointed neural paths, just as a bullet travels through the barrel of a gun. The environment releases the energy of the body, but does not direct it. The direction is furnished by the body itself. According to the opposing view, there is an element of direction, somewhere and somehow, which is not reducible wholly to pre-existent neural pathways. If we agree to rule out mind and consciousness, in the traditional sense, this direction must come in some way from the environment. That is, the environment does not merely release the energy of the body, but determines the manner in which it is expended or applied.

To explain how the activity of the body may be directed or controlled so as to secure desirable results without bringing in a " mind " or consciousness to do this work is no easy task. Consequently we can understand the temptation to stick to mechanical explanations. Moreover, these explanations have a certain plausibility. It has been

suggested that if a visitor from Mars should make careful observations, first of a bee building a cell in a hive, and then of an architect building a skyscraper, he might be more impressed with the resemblances than with the differences. The bee undoubtedly builds in such a way as to save time, to economize on wax, and to secure maximum strength of structure. This represents in general the same thing as is done by the architect. Why should not the same principle of explanation apply to both cases?

The explanation of behavior in terms of reflexes has the advantage of a certain simplicity. A close examination of the facts, however, soon suggests that the explanation must either be elaborated considerably or else it must be discarded. According to the theory under consideration, it would be theoretically possible to construct an automaton that would enact to perfection the part of a Romeo bent on seeing his Juliet. It would be necessary, indeed, — since the course of true love never did run smooth, — to provide this automaton with reflexes for scaling walls, opening windows, constructing a rope out of his mantle, moving stealthily, and, in short, for meeting the various exigencies of the situation. This becomes complicated, but perhaps not beyond all reason. A more serious difficulty is encountered when we remind ourselves that all these different reflexes must be so combined as to ensure the success of the undertaking. Our Romeo must not convert his mantle into a rope when a ladder is handy, still less must he be so constructed that the mere sight of a mantle sets off the reaction for cutting it into strips. He must not open the windows in the first house that he comes to on his journey to Juliet, nor must he waste his efforts in trying to open a window that is already open.

Moreover, he must be so constructed as to hunt around for something with which to pry open a window that is stuck. In addition to all this, he must be protected against irrelevant stimuli. If a garden seat which he happens to pass on his way to Juliet's abode should release the mechanism for sitting down, the whole adventure would have a disappointingly unromantic ending.

It is difficult to see how our mechanical Romeo could be depended on to act in accordance with the requirements of circumstances, unless he were put together by some power or agency possessing unlimited foresight and skill. Simply to endow our Romeo with plenty of reflexes gives no assurance that he will be able to act appropriately. Unless the reactions can be made to suit the occasion, he will be as ill-adjusted as a bull in a china shop, since what will suit the occasion depends altogether on the occasion itself. Sitting down on the garden seat, for example, may become an appropriate part of the proceedings, if it turns out that a wait is necessary and if the seat is so placed that Romeo can keep an eye on doors and windows without being observed himself. How can we make sure that the right reaction will normally take place? There is something lacking in the explanation. It is necessary to provide some sort of control which will determine the order or the combination in which the reactions of the organism are to be set free. The appropriateness of the present act is determined by reference to a future act or future state of affairs, *i.e.*, appropriateness is dependent on foresight and purpose.

Perhaps the essential point will stand out more clearly if we observe how Romeo proceeds in the presence of unforeseen difficulties. His path is obstructed, let us say,

by a garden wall that is too high to be vaulted. So he explores the surrounding territory and returns with a box on which to stand. The wall is still too high. So he takes his knife and cuts niches into the wall for climbing. Next he removes his shoes, so as to make the climbing easier, and throws the shoes over the wall. Perhaps in addition to all this he places the knife between his teeth, so as to have it handy for cutting further niches. Each of these acts taken separately is doubtless based on previous habits. The difficulty lies in explaining how these several acts get combined so as to become means to an end or elements in an inclusive program, which is about what we mean by purposive behavior.

The import of the foregoing discussion is that the reduction of purposive behavior to a sequence of reflexes is a bit too simple. The reflexes which together make up a case of purposive behavior are not just placed in a row like beads on a string. Our explanation must provide also for the string which holds the beads together, that is, it must give to the activity as a whole a unity which controls or directs each of the constituent parts. In other words, we must provide some sort of substitute for the purposive control which the older psychology placed in an extraneous "consciousness" or "will."

It is very much to the credit of Thorndike that he recognizes this fact and undertakes to provide what is lacking. The substitute for the traditional "will" which he provides he calls the "conduction unit," and this conduction unit, in his view, makes it possible to explain how it comes about that the reflexes which are released are appropriate to the situation in which they function.

What, then, is a conduction unit?

"By original nature," says Thorndike, "a certain situation starts a behavior-series; this involves not only actual conduction along certain neurones and across certain synapses, but also the readiness of others to conduct. The sight of the prey makes the animal run after it, and also puts the conductions and connections involved in jumping upon it when near into a state of excitability or readiness to be made. Even the neurone-connections involved in the response of 'jumping and reaching it' and those involved in triumphing over it and rending it or taking it to one's lair are in a different condition when a chase is started than they otherwise are. The activities of the neurones which cause behavior are by original nature arranged in long series involving all degrees of *preparedness* for connection-making on the part of others. When a child sees an attractive object at a distance, his neurones may be said to prophetically prepare for the whole series of fixating it with the eyes, running toward it, seeing it within reach, grasping, feeling it in his hand, and curiously manipulating it."[1]

The passage just quoted contains the answer to our question. Activities that are above the level of simple reflexes involve this principle of *readiness,* which means that the responses actually going on are accompanied by a certain "excitability" or "preparedness" on the part of other responses. These latter are held back; they do not get into overt action, but they "prophetically prepare" for the moment when it is their turn to appear before the footlights. That is, the situation of the moment involves a whole set of reactions, which are coupled together for the time being. This set of reactions constitutes a functional unit, and this is what Thorndike calls a conduction unit. A conduction unit includes all the responses which are in a state of readiness or preparedness.

This explanation is a departure from the view that the

[1] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 53. Teachers' College.

more complex forms of behavior are only a succession of reflexes in which the completion of one reflex serves to release the next one, just as the cars in a freight train get into motion successively when the engine starts up. Thorndike's account is less simple. According to his account, the later responses do not wait until the earlier ones have been completed, but they all start simultaneously. The situation is more like what happens when the water of a river finds an opening in a dam. All the water is pressing towards the opening, but the great body of the water is held back and has to wait for its turn to flow through. The "preparedness" or antecedent stimulation of the later responses presumably means that these later responses are already started but that they are restrained from overt action until a proper sequence has been established. For example, when a hungry person sees food, the whole "conduction unit" which constitutes the process of eating is set off; his hands, his jaws, his salivary glands, and other organs are set in motion simultaneously. But these reactions must wait on one another. The hand must move before there can be actual biting and chewing; these acts in turn must precede swallowing, and so on.

One advantage of this doctrine is that it suggests how the organism is protected against distracting stimuli. The reflexes that do not happen to belong to the conduction unit which is in operation at a given moment are not stimulated very easily. The organism is not "set" to respond to them. Thus a person who is trying to locate a friend in a crowd is less likely to notice strangers than he would be if he were not looking for somebody in particular; a person absorbed in a story is not so apt to notice

misprints as a proofreader would be. The Romeo of our former illustration manages to pass the garden seat without sitting down because the act of sitting down is not included in the momentary "set" of his nervous system. A person who is hungry has a different set or attitude from one who has just finished a good meal. Or if a pupil is "set" for the study of geography, the word "Washington" is likely to bring to mind the city or state bearing that name; whereas, if he is "set" for history, the word will have reference to a person who lived more than a hundred years ago. "Any process of learning is conditioned by the mind's 'set' at the time."[2]

This doctrine of the conduction unit, however, does not go very far towards explaining how responses are selected. It does, indeed, indicate how it happens that responses which are not included in the conduction unit are kept off the stage. Those responses which are not in a state of readiness or preparedness do not stand much chance of participating in what is going on. But this is only the negative aspect of the situation. Within the conduction unit there is still need of selection and organization. It may happen that so many of the responses which are in a state of readiness are not relevant to the successful performance of the act. Thus the cats used by Thorndike in his experiments scratched and bit and clawed more or less at random in their attempts to escape from the cage. We are still a long way from understanding how a unified, purposive course of activity can emerge from such a mass of miscellaneous responses. Some account must be furnished of this process, and, moreover, we are not permitted

[4] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 134. Teachers' College.

to introduce a "mind" or "consciousness" as a *deus ex machina* to select and order the appropriate responses and to suppress the rest.

This problem Thorndike undertakes to solve by means of his doctrine of "satisfiers" and "annoyers." He lays down as a fundamental principle that "for a conduction unit ready to conduct to do so is satisfying, and for it not to do so is annoying." [3] Thus it is satisfying to go through with a process of eating, writing, or dressing: and on the other hand, it is annoying if the apple that we are about to eat falls from our hand, or if our pen begins to scratch, or if a collar button drops on the floor. In each case the original conduction unit suffers interference, and the result is annoyance. With small children — to say nothing of adults — such interference easily results in an explosion of blind rage.

But this is only a first step. It tells us that when the functioning of the conduction unit proceeds smoothly, we experience satisfaction, and when this is not the case we suffer annoyance. We have not yet learned how the responses which make up a conduction unit are arranged in an appropriate sequence. How does it come about that we *first* reach for an apple, *then* grasp it, *then* convey it to the mouth, and so on, if all these activities are started off simultaneously and if there is no "mind" or "consciousness" to guide the process?

Here again Thorndike relies on the principle of "satisfactions" and "annoyances." His cats, for example, engaged in many sorts of reactions in their struggles to escape from the cage. The responses of scratching, biting,

[3] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 54. Teachers' College.

clawing, and vocalizing were all in a state of readiness. Most of these responses were random and futile, and so did not result in satisfaction. The right result, on the other hand, would be attended by satisfaction, and hence, this response would become more firmly established than the others. This is due to the fact that whenever satisfaction results, then, according to the doctrine, the act producing it " is stamped in in connection with that situation." [4] On the other hand, those responses which led to nothing resulted in annoyance, and these were " stamped out," that is, the bonds connecting these responses with the situation tend to weaken and disappear. In general, then, we may say that the activities in a conduction unit become organized into appropriate temporal sequences, not through " foresight " or " purpose," but as a result of the operation of satisfactions and annoyances.

This explanation has a certain plausibility until we examine it more closely. When we do so, it appears that two wholly different uses are made of satisfaction and annoyance in the explanation of behavior. First it is stated that " for a conduction unit ready to conduct to do so is satisfying and for it not to do so is annoying." This principle, however, does not take us the whole way. On this basis we should be obliged to infer that Thorndike's cats got as much satisfaction out of the random and unsuccessful responses as they did out of the correct response which released them from the cage. The unsuccessful responses are just as much a part of the conduction unit as any other. The cat in the cage is all " set " to bite and scratch and claw. The conduction unit is ready to

[4] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 129. Teachers' College.

conduct and it is conducting, which is all that is needed to give satisfaction.

This clearly will not do. Unless some sort of premium is put on the right response, the cat will never learn anything. It will just keep on biting and scratching and will be enjoying itself all the while. Consequently the explanation is changed. We no longer say that a conduction unit yields satisfaction merely by functioning, but only by functioning in a certain way. The *right* responses of the conduction unit are satisfying and the others are annoying. That is, we must now distinguish, within the conduction unit, between those responses which are satisfying and those which are not. But since the responses are not labelled "right" and "wrong," it is clear that we must go outside of the conduction unit for a test or standard of "right" and "wrong." In some way or other the selection and organization of the responses must come from the environment. As Thorndike himself says:

"It is true that mere freedom to complete the motions to which original nature impels in a given situation is satisfying, but the majority of original satisfiers involves also the production by the movement of some one effect rather than another. To run when nature so moves is satisfying, but to get from this place, or to that place, or nearer that animal, or ahead of this man, is commonly the larger satisfier in instinctive responses of flight and pursuit." [5]

This second explanation of how the conduction unit operates to yield satisfaction is virtually a surrender of the attempt to explain purposive behavior. If we say simply that satisfaction results whenever a conduction unit that is ready to conduct gets a chance to function, we

[5] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 52. Teachers' College.

need not take account of the environment at all. Everything can be explained in terms of what happens within the body. But in that case the clawing cat should be at peace with the world. On the other hand, if satisfaction depends on producing some result outside of the body, then nothing has been explained. The cat in the cage is not made happy by getting an opportunity to struggle; he wants to get out. Or, if this is assuming too much in the way of an intention or purpose, the situation in which the cat is placed at all events controls the struggles of the cat in such a way as to discourage the futile responses and to reward the appropriate responses with "satisfaction." This control is still more apparent in the case of our hypothetical Romeo, who engages in relatively few random movements. Consequently we are back to our original difficulty. The environment does not simply release the mechanisms of the body, but in some way or other must steer the body so as to produce desirable results. This process of guiding or directing is what constitutes purposive behavior, and this is what we need to have explained.

Unless we bring in some control or direction which the conduction unit itself cannot furnish, the explanation gets nowhere. In flight and pursuit, as Thorndike says, satisfaction does not result primarily from mere running, but from the fact that by running we get "from this place, or to that place, or nearer that animal, or ahead of this man." But why should running in one direction be more satisfying than running in some other direction? There can be no answer to this question, except on one condition, *viz.*, that the activity is directed to some end. The running is not mere running, but is running-to-achieve-some-result.

The running is somehow tied up with other responses, such as clutching the victim when he is overtaken. The running is successful and satisfying, even before the victim is reached, because it forwards or promotes a certain "program" of activities which is present from the start. But what is the source or nature of this "program" or guidance by which activities are directed toward an end or goal? Here Thorndike fails us. He is quite right in his insistence that something more is involved than merely a sequence of reflexes. But this "more," which gives organization and the quality of adaptation to behavior, is not furnished by the conduction unit. If we are not permitted to bring in a "mind" or "consciousness," we are obliged to infer that the environment somehow takes a hand in directing the activities of the organism. But how this comes about is a problem of some magnitude.

To sum up, behaviorism has oversimplified its problem by assuming that purposive behavior can be reduced to a sequence of reflexes. As against this view, Thorndike argues that the responses entering into a complex activity are related to one another in a more intimate way than just temporal sequence. His doctrine of the conduction unit is an attempt to show how these various responses modify and condition one another, owing to the fact that they are started off simultaneously. This is a long step in advance, but we are still left without insight into the nature of purposive behavior. The responses do not just organize themselves within the conduction unit, because there is no principle or method provided for deciding which of the responses within the conduction unit are relevant and which are not. We cannot appeal to "satisfactoriness," because an activity, as, *e.g.*, running, is satisfactory

only if the running takes place as part of a total, adaptive activity. But this is as much as to say that the activity of running is satisfying only if the whole set of responses has already been organized into a unity directed towards the realization of an objective result.

The doctrine of the conduction unit is born of the insight that the problem of behavior is not merely a problem of stringing independent reflexes together so as to make them march in Indian file. But the attempt to explain behavior wholly from the inside of the body betrays a suspicious fondness for behavioristic methods of explanation. First we are told that satisfaction springs from the functioning of the conduction unit, when it is ready to conduct. From this point of view satisfaction can be accounted for without taking into consideration any changes outside the body. Next, the attempt is made to show how behavior is modified as a result of satisfactions and annoyances. When we come to this part of the exposition, however, we find that satisfaction results, not from the mere functioning of the conduction unit, but from something else. It is now tied up with changes in the environment. These external effects, since they can give satisfaction, can exercise control over behavior. But how this comes about is not explained, and so the problem of purposive behavior is left where it was. Apparently there is no clear recognition of the fact that there has been a shift of position. First, satisfaction is explained wholly from within the body, and later it is explained in terms of changes produced in the environment.

The irony of the situation lies in the fact that Thorndike leaves the behaving organism in even worse condition than is done by behaviorism. From the standpoint of

behaviorism the organism can at least react in terms of independent reflexes. When Thorndike is done with it, however, it cannot act at all. Thus the conduction unit involved in the simple act of reaching for an apple and eating it includes responses which conflict with one another. There is one response for reaching, and another response for conveying the apple to the mouth. These two movements are in opposite directions, and if the two responses are set off simultaneously they are bound to get into each other's way. If all the responses in a conduction unit are stimulated at the same time, it is hard to see how anything could happen except a variety of futile wiggles. As long as we do not make adequate provision for the control or guidance of behavior, there can be no adaptive activity, but at most only a mechanical resultant of forces.

The fundamental difficulty with Thorndike, as with the behaviorists, is that he depends too exclusively for explanation upon the nervous system. The environment does nothing except to press the buttons which release the reflexes. This explanation has been seriously challenged of late by other psychologists, who likewise make use of experiments with lower animals to prove their conclusions. The debate is of importance in this connection because it suggests the way to a different interpretation of human behavior. (See chapter XIII.)

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CHAPTER XII

THE DILEMMA OF PSYCHOLOGY

It is easy to understand why the nature of purposive behavior should be of special significance for educational procedure. If there is a difference in kind between purposive behavior and the behavior of a machine, then this difference is precisely what counts in educational theory and practice. From the point of view of psychological theory the problem of purposive behavior is equally important; and, what is worse, it constitutes a serious predicament. We seem to be shut in to two alternatives, neither of which is acceptable. On the one hand we can maintain the distinctiveness of purposive behavior, if we have the hardihood to reinstate the "mind" or "consciousness." On the other hand we can get rid of purpose by reducing everything to mechanical action, if we are content to close our eyes to the difficulties that are involved. Neither alternative warrants a great deal of enthusiasm. We seem called upon to choose between two uninviting possibilities.

What is to be done about it? The purpose of this chapter is not to find a way out of the dilemma, but to show that this dilemma has its source or origin in the dualism of tradition and that psychology cannot come into its own until it becomes emancipated from this tradition. In order to deal effectively with the problem of purposive behavior, it is necessary to attack the problem

at its source and see how the problem, as it has shaped up in current psychology, is the outgrowth of a false separation or contrast between mind and matter.

In approaching this topic we may remind ourselves that the concepts of mind and matter were gradually evolved in the intellectual development of the race. The product of this development is frequently designated as dualism. According to the theory of dualism, reality consists of two radically different kinds of substance or being, *viz.,* mind and matter. This dualistic doctrine was a long time in coming, because the formulation of this doctrine required a high order of intelligence. After it had once been reached, however, it eventually became the basis for moral, religious, and social beliefs, so that this dualism became firmly embedded in our intellectual heritage. In the end dualism became so interwoven with our whole outlook on life that it seemed a very plausible and almost self-evident doctrine. To the average person of today it is reasonably clear, without argument, that reality is made up of mind and matter, and that man is a composite, consisting of mind, or soul, and body.

This dualistic view became the point of departure for psychology. To a considerable extent this point of view has prevailed all along the line. But, as we have seen, this original dualism had considerable difficulty in maintaining itself. In the course of time the road forked, one branch leading to mental states and the other to behaviorism.

Looking back on this development we can see that it was inevitable. Dualism is an unstable thing. Mind and matter, considered as two kinds of existence, do not get along together any too well. It seems plausible enough

at first sight to assume that man consists of both mind and body. But when we begin to study the assumption, the balance of this original relationship is constantly being upset. Either mind crowds body out of the picture, or else the body usurps all the privileges and prerogatives and leaves no place for mind.

Let us see how this comes about. Starting with the dualism of common sense, psychology is disposed to take for granted that the mind is a sort of observer which takes note of things outside the body. But presently certain problems arise. Let us suppose that two observers are looking at an object, one of whom is color blind. Let us suppose further that one of the observers sees the object as red while the other sees it as gray. Now if the object is " really " red, we say that the gray is an illusion, a subjective thing. The red is in the object, but the gray is not. What then is to be done about the gray? Where is the gray?

This becomes a formidable question. The gray is not in the object, for by hypothesis the object is red and not gray. We are tempted to say perhaps that it is in the ether-waves, but this won't do any better. If the gray were in the ether-waves then the whole distance intervening between the object and the observer would be gray. The ether-waves have no color at all. They have motion, which produces color in the mind of the observer, but they themselves are without color. Apparently, therefore, the only alternative left is to say that the gray is in the mind of the observer.

Perhaps this has a mysterious sound. But let us consider for a moment what takes place in dreams. In the dream-experience we see colors, in much the same way as

in waking moments, but there are no objects and no ether-waves impinging on the eye. The colors are just "dream colors"; they are nowhere in space. They are not to the right or to the left of any physical objects; they exist in a world of their own, and although we see them in the dream as occupying space, they do not occupy any real space. It is almost as if they existed in a fourth dimension, without any contact with the space of physical objects. Consequently we say that they are not really in space at all. Neither have they any physical properties. They are mental or "in the mind."

Now let us return to the original illustration. The gray seen by one of the observers is labelled a subjective thing; it is "in the mind." But what shall we say of the red that is seen by the other observer? We are tempted to treat this color differently. It is not in the mind but in the object. But here, too, we presently come upon difficulties. The red is an effect of ether-waves quite as much as the gray. We say that the two observers see different colors, because of differences in the retinas of their eyes, but apart from this the process of seeing is the same in the two cases. If one of the colors is in the mind, why not the other as well? Here again the dream experiences furnish a convenient illustration. In dreams everything that is experienced is supposed to be in the mind. But this is equally true in our waking moments. The physical object does not move bodily into the mind when we look at it. It is *represented* in the mind by a picture or photograph of itself, just as objects are mirrored in the pupil of the eye. To speak generally, all experiences are at most representatives or pictures of external objects; the object itself is not in the mind but is represented in the

mind by a picture or symbol. Thus we emerge with the conclusion that what we immediately experience is something non-spacial or mental; and this is what is known as the doctrine of consciousness or mental states.

This conclusion, it will be observed, discriminates strongly against physical objects. The latter are no longer on an equal footing with mind. They have been crowded out of immediate experience altogether. We do not see objects directly at all, but only pictures or duplicates, from which we infer the existence of physical objects. To use an illustration, we are told that the moon always keeps the same side turned towards us. We never see the back side of the moon at all. We might say, then, that the back side of the moon gets into our experience only by means of a representative, *viz.*, the front side. When we see the front of the moon, we infer the existence of the other side; and in the same way the pictures in the mind lead us to infer the existence of physical objects.

This result is unexpected and perhaps not altogether convincing. Is any other conclusion possible? Suppose we start all over again and assume once more a mind and a body both of which are directly experienced. We call in once more our two observers. To the one who reports that the object observed is gray we say that he is in error. The object is not really gray. But the one who reports that the object is red is likewise in error. The object is no more red than it is gray. If we want to know what the object is like we call in the physicist, who explains to us that the object has no color at all. It consists of atoms or electrons, and the colors that we see are not pictures, any more than the pain of an aching tooth is a picture of a jumping nerve. All these experiences are just

by-products, so to speak; the real things are the things that science tells us about. As Huxley puts it: "The nervous system stands between consciousness and the assumed external world, as an interpreter who can talk with his fingers stands between a hidden speaker and a man who is stone deaf." [1]

So far we get the same conclusion over again, *viz.*, that the whole content of what we immediately experience consists of mental states. The suggestion, however, that these mental states are just a sort of by-product of physical reality is worth following out further. What sort of by-products are they? We can get a clue to the answer if we note how the physicist interprets certain qualities which we commonly regard as physical. We are told nowadays that matter consists of electrons. These electrons have no color, neither have they the quality of solidity. Solidity is a physical quality; but it, too, is a by-product. The electrons themselves are not solid, in the usual sense; they "produce" solidity, so to speak, by acting in a certain way. That is, each electron acts so as to repel other electrons from the space which it occupies, and this activity is what we call solidity or hardness. The quality of solidity is a product or outcome of the movements of the electrons, which is to say that solidity is really a form of motion.

Having reached this conclusion, we can extend it to those by-products which are known as mental states. If solidity, redness, weight, and the like, can be reduced to movements, there is no apparent reason why this form of

[1] Huxley, T. H., *Science and Culture, and Other Essays,* Chapter *On the Hypothesis that Animals are Automata,* p. 216. D. Appleton & Company.

explanation should not apply to emotions and volitions. They, too, are just movements. When we take this step we become behaviorists. According to behaviorism, to say that a man makes a decision or feels an emotion of anger is merely to say that his brain is active in a certain way. All that takes place is just a form of movement. We got into the habit of calling these occurrences mental states at a time when science was not far enough advanced to reveal their true character. But the time has now come to abandon the notion of mental states.

All that we need to do, then, to escape from the doctrine of mental states is to take one further step. If we reduce these mental states to forms of motion, as behaviorism does, we suddenly find ourselves in a totally different world. It is a different world because the situation is now entirely reversed. This time it is mind that has been crowded out of doors. Apparently one or the other has to go. There is not room enough for both mind and matter. As long as we hold to the reality of mind, physical objects show a tendency to retreat beyond the range of experience. If we insist on keeping physical things within experience, then mind begins to evaporate. It is a plain case of what is known in suits for divorce as incompatibility of temperament.

It is necessary, then, to make a choice. Shall it be the doctrine of mental states or shall it be behaviorism? Before deciding this question it is expedient to make further inquiries. Which of the two holds out a reasonable assurance of giving us an adequate interpretation of the facts?

Let us begin with an examination of mental states. When we begin to examine the matter more closely, we

come upon some startling implications. Perhaps we might in time become reconciled to the idea that we do not know physical objects directly but only at second hand, through inference from mental states, if nothing more were required of us. But presently we are asked to give up the belief in physical objects altogether. We know physical objects only through inference, but is it sound inference? By hypothesis matter is entirely different from mind, and it is something that we never have experienced and never can experience. What, then, is the sense of talking about matter at all?

It might be replied that, though we have never experienced matter, nevertheless we can know something about it, because we assume that matter is like the pictures which we have in our minds. To this there are two answers. One is the answer made by Bishop Berkeley long ago, when he said, "An idea can be like nothing but an idea." This is obvious enough in some cases. For example, if a man having a toothache were told that there was something exactly like his toothache somewhere else in the universe, it would never occur to him that this thing resembling his toothache might be a lump of matter. This would be as absurd as to suppose that there might be a bit of matter somewhere which was exactly like the square root of minus two. Nothing can resemble a toothache unless it *hurts,* and a hurt is not a physical thing.

According to Berkeley, the case is not essentially different when we consider qualities like colors and sounds. These, too, must be *felt,* that is, the qualities as immediately experienced are mental and not physical. They do not happen to have the quality of "pain" or "hurt," as

in the case of the toothache, but the qualities which they do have are just as " mental " as pain. Suppose we compare pain with sound. To use scholastic language, a hurt is one mode of psychic reality and a sound is a different mode. There is no such thing as a sound in the abstract; every sound is a particular sound, with just such a pitch and volume, and perhaps overtones, and just such a quality of pleasingness or the reverse. The point is that in order to be a particular sound, it must be a " felt " sound, as a pain must be a " felt " pain.

If we once grant that there are mental states, then Berkeley's argument that " An idea can be like nothing but an idea " has considerable weight, and the belief in the existence of matter has little ground to stand on. But is it necessary to grant that there are such things as mental states? As was pointed out in an earlier chapter,[2] the doctrine of " consciousness " has two main arguments, which are supposed to substantiate its contention. One of these is the physiological argument, the other is the argument from relativity. It is time now to present a brief review of these arguments.

The physiological argument, it may be recalled, holds that it is not possible to experience physical objects directly, since the stimulation coming from these objects must be relayed by means of ether-waves, sense-organs, and neural pathways. All this apparatus, so it is contended, comes in between us and the objects perceived. The only way that we can account for visual perception, then, is to assume that there is a physical object at one end of the process and a mental state or psychic representative of the object at the other end. The object,

[2] *Cf.* Chapter VI.

consequently, is known only indirectly, *i.e.*, through an inference from the mental state.

This argument has a certain plausibility, but in the end it turns out to be a boomerang. The remarkable thing about this argument is that it contradicts its own premises. It starts out on the level of common-sense dualism by assuming that man has a mind and a body, and that we have knowledge of the body through immediate experience. Having assumed a body and sense-organs, it then proceeds to show, by means of the body and the sense-organs, that there is room for doubt as to the existence of body and sense-organs. The only things that we know immediately are mental states; everything else is hypothetical at best. This is clearly a case of sawing off the limb that we are sitting on. Perhaps it is true that there are mental states, but we can hardly claim that this argument offers anything in the way of proof. As far as this argument is concerned, the belief in mental states is as gratuitous as the notion that the moon is made of green cheese. It certainly seems odd to reason that we cannot get at physical objects because the body and its sense-organs interpose themselves between us and the objects, and that, consequently, since the sense-organs thus interpose themselves, we are unable to say whether we have any body or sense-organs at all. As Santayana once remarked, this argument amounts to saying that because we experience things by means of a body, therefore we have no body.[3]

The other argument, the argument from relativity, is

[3] For more extended presentations of the argument here criticized see Karl Pearson, *The Grammar of Science*, Chapter II. A. & C. Black. also C. A. Strong, *Why the Mind Has a Body*, Chapter VIII. The Macmillan Company.

not quite so easily disposed of. Concerning the facts of relativity there is no dispute. We know that sense-qualities, such as colors, sounds, shapes, sizes, and all the rest, vary according to their relation to the sense-organs and according to the disposition of the nervous system as a result of previous experience. The interpretation of these facts, however, is quite another matter. Are we warranted in assuming that there must be "fixed" or "absolute" shapes and sizes and colors and sounds in the universe? We do not feel quite so sure of this as we used to. When we have to do with the "position" of an object in space, for example, we are not concerned with "absolute" position, but with position relative to other objects. It is not certain that absolute position means anything. Perhaps the same may be said of other qualities. It may be that colors and sounds are as relative to sense-organs etc., as position is relative to other positions. If it is safe to make a reference to Einstein, one might hazard the suggestion that relativity will be the watchword of the future. The question of relativity with reference to sense-qualities will be taken up in a different connection at a later time.[4] At present it is sufficient to say that the relativity of sense-perception is hardly sufficient ground to warrant the inference that immediate experience consists of mental states.

The physiological argument and the argument from relativity are introduced here only to show that they do not prove anything conclusively. On the other hand the objection to the doctrine of mental states centers on the fact that this doctrine cannot be made to square with the deliverances of science. This incompatibility was first

[4] See Chapter XIV.

made evident in a significant way by the work of David Hume. Hume is known to fame as the great skeptic, because he showed in detail that if we limit ourselves to mental states there is no rational basis for belief in anything. The relation of cause and effect, for example, which he discusses at great length, turns out to be only a matter of association of ideas and nothing more. The lightning-flash makes us expect the thunder-clap, merely because these two experiences have happened together on former occasions. Considered purely as mental states, there is no relation whatever between these two experiences except the relation of invariable temporal sequence. Back of this relation it is impossible to go. Consequently the relation of causation is purely subjective; what we call necessary connection evaporates into association of ideas.

This is not the place to elaborate this argument in detail. It is mentioned here because Hume's treatment of the subject is one of the classics of philosophy. It exerted a profound influence on subsequent thought, and his conclusion has never been refuted. If we start with the proposition that immediate experience is limited to mental states, the whole structure of the universe simply collapses and disappears. This same result can be indicated in another way. As science tells the story of the universe, conscious beings appear on the scene in the course of evolution after millions of years of antecedent cosmic process. But now it appears that time is a subjective thing, and all this talk about things happening apart from mind is out of place. These cosmic processes are just constructs in the mind of the scientist for the convenient ordering of our impressions. We cannot assert that anything preceded the existence of conscious beings at all. In fact

the whole notion of "before" and "after" applies only to what goes on within consciousness; it has no application at all to anything outside of it. We cannot say that something came before mind, because time itself is a mental thing. The same argument applies to the conception of space. In the language of Karl Pearson: "It is idle to speak of anything as existing in space or as happening in time which cannot be the material of perception. Whatever by its nature lies beyond sense-impression, beyond the sphere of perception, can neither exist in space nor happen in time. Thus the scientific conception of causation, or that of uniform antecedence cannot with any meaning be postulated of it." [5]

For reasons of the kind that have been indicated the doctrine of mental states has lost much of its earlier popularity. If these considerations have any weight, it is hard to suppress the feeling that there is something wrong with the premises of the argument. The doctrine of mental states puts everything into the head of the experiencing person and then tries to put the head inside, too, which begins to look like hocus-pocus. So it seems that we shall have to adopt behaviorism, however reluctant we may be to do so.

Before making this choice, however, common prudence suggests that we try to ascertain whether behaviorism has anything better to offer. In the development of behaviorism, as we have seen, "mental" facts were first treated as "by-products" or harmless concomitants of physical processes and then were reduced to forms of movement. This procedure is apparently sanctioned by the practice of the physical sciences generally. Of late years science

[5] Pearson, Karl, *The Grammar of Science,* p. 191. A. & C. Black.

has been arguing that all reality is made up of electrons. All "the choir of heaven and furniture of earth" consists of electrons variously arranged and disposed.

This reduction of mental states to movements, it appears, must be undertaken in the interests of safety. As long as mental states are given any distinctive status at all, that is, as long as we recognize them as distinct psychic existences, we are in danger of lapsing back into the theory of mental states. It is well enough to say that we will ignore them, but if there are such mental states and if they, and not physical objects, are what we immediately experience, they cannot be ignored altogether. Our starting point must necessarily be the immediate facts of experience, and so we easily slip back into the old groove of dualism. This danger is obviated if we make a clean sweep of the whole business and eliminate altogether the pestiferous dualism out of which so many problems sprouted, by reducing the whole of mental life to movements.

This is not only expedient, but, as stated a moment ago, it has a certain antecedent plausibility. It is only what science is doing, as far as possible, all along the line. We are assured that science has reduced colors and sounds to movements. There are no colors or sounds in the physical environment. For a long time we have been content to label these qualities as purely "subjective" and to say that they are "in the mind." But the mind has now been abolished. There is no convenient attic or limbo at hand where these troublesome things can be put. If we leave them floating around as something different from physical things, we still have mental states, no matter how much we may try to camouflage the fact.

The only way out is to take the animal by the horns and say they don't exist at all. Nothing exists but movement.

At this point it becomes necessary to take time out for reflection. Just what is it that we are asked to believe? Shall we say that we do not see colors or hear sounds? This is a bit too extreme, since it is contradicted every hour of the day. Or does this "reduction" mean that wherever we experience colors and sounds movements are also present? This is presumably true. The scientist assures us that this is the case, and since he is the expert, he has the last word on this point. But the assertion that colors and sounds are connected with motion is far from saying that colors and sounds do not exist at all. We might as well say that, since there can be no husband unless there is a wife, all husbands are really wives in disguise.

What the behaviorist means to say is apparently that certain things which seem to be quite different from one another are in fact absolutely the same. He does not deny that the eye sees colors and the ear hears sounds. Nor is he content to maintain simply that colors and sounds are accompanied by movements. A person need not be a behaviorist to accept this view. What he means is that color and movement are the same thing; that there is "really" no difference.

If this is true, it is at any rate far from self-evident. If we compare a color with a movement we are not exactly impressed with any likeness between the two. On the contrary it is hard to discover any likeness or identity at all. A color is a color and a movement is a movement. How are we to get any sense out of the assertion that these two things are really one and the same?

If we take an example from the field of physical science, the same difficulty confronts us. The chemist tells us that water consists of two gases, *viz.*, hydrogen and oxygen, the combination of the two being represented by the formula H_2O. What does it mean to say that water *is* hydrogen and oxygen? Water is curiously unlike these gases. It has a freezing point of its own, it flows down hill, it quenches thirst, it passes off into steam, etc. In all these particulars it differs from both hydrogen and oxygen. If the expression, water is H_2O, means that hydrogen and oxygen under certain conditions take on new properties, *i.e.*, change into water, or that these new properties can be made to disappear and to be replaced by hydrogen and oxygen, we can not only understand the statement, but we can verify it. Moreover, if we study the chemical processes involved, we discover no warrant for saying anything more than this. To say that hydrogen and oxygen are a cause of water, or that water in turn can become a source of hydrogen and oxygen is science. To say that water *is* hydrogen and oxygen is not science; it is nonsense. Water is water; hydrogen is hydrogen; and oxygen is oxygen. A thing is what it is; it is not something else. What it can mean to say that water is H_2O, or that thought is a movement, is past finding out. Statements of this sort rank with the incantations of the aboriginal medicine man, but with the advantage on the whole in favor of the medicine man, since he does not claim that his verbiage has the sanction of science.

To put it differently, the whole notion of "reduction" rests on a misconception. There is no such thing as reduction anywhere, in the sense of saying that one thing is identical with another, different thing. There is plenty

of reduction, if by reduction we mean that one thing is the cause of another thing or changes over into something else by taking on new properties. If we stay within the limits of verifiable fact we cannot say that a color *is* a movement, but movement is connected with or is a cause of color. To say that a color *is* a movement is like saying that a man is his own grandfather.

It would probably be unnecessary to insist so strenuously upon what ought to be obvious, if the language of the natural sciences were not a source of constant confusion and ambiguity. The physicist is not seriously concerned with the question whether color is a movement or a product of movement, and so he identifies the two. Color is just a movement, *as far as he is concerned; i.e.,* he is not interested, as a physicist, beyond the fact of movement. So he brushes everything else aside, which, on the level of physics, is quite legitimate. He is never confronted with the necessity of distinguishing between the proposition that color is a movement and the proposition that color is a product of movement. Consequently, he economizes on his thinking by not bothering himself with a question of this sort. The psychologist, however, is in a different position. It is necessary for his purpose to distinguish between the two propositions, because he has a different problem. He claims that he is giving an account of what we have been accustomed to call mental life, and so he is not permitted to beg the question from the beginning by taking advantage of an ambiguity in order to reduce all mental life to movement. To do so in his case is not to economize on thinking but to become a victim of laziness or antecedent prejudice.

It is not difficult to sympathize with the behaviorist in

his hostility to mental states. Some of the reasons to justify such hostility have already been given, and more might be added. But it is more difficult to be tolerant with his refusal to recognize or maintain the distinction between identity and causal relation. The behaviorist slips from the one to the other in accordance with the exigencies of the argument; and his failure to understand the difficulty that is troubling persons who do not happen to agree with him is apparently due to the preconception that all criticism of behaviorism is inspired by the belief in mental states. He foresees that if he makes any concession at all, he will find himself moving back to the theory of mental states, and he is bound to have done with that.

One further difficulty may be mentioned in this connection. As was said before, the tendency has been towards the reduction of experienced qualities to movements. This process of reduction is applied not only to colors and sounds, but to such qualities as solidity and weight. Things evaporate into movements, and the word " things," as used in this connection, includes the body of the individual as well as the objects that make up his environment. If we follow out the logic of this reasoning to the bitter end, we seem to emerge with the conclusion that all reality consists of movements. Just what this may mean it is difficult to say. Objects in motion are familiar enough as an experience, but when these objects themselves are said to be forms of motion the element of mystery enters. To common sense it means motion with nothing to move except itself. It is no wonder if in the face of such a phenomenon our thoughts stray to Alice in Wonderland and her experience with the Cheshire Cat. This wonderful cat at one time " vanished quite slowly,

beginning with the end of the tail and ending with the grin, which remained some time after the rest of it had gone. 'Well! I've often seen a cat without a grin,' thought Alice, 'but a grin without a cat! It's the most curious thing I ever saw in all my life.'"[6]

If the difficulty of reducing qualities to movements seems too academic or theoretical, there still remains the more practical difficulty of giving a plausible account of purposive behavior in terms of conditioned reflexes. This difficulty has been discussed at some length in the preceding chapter and need not be reviewed here in detail. Suffice it to say that there is no way in which a collection of conditioned reflexes can be made to combine so as to provide the adaptive behavior such as human beings are daily engaged in. Thorndike's doctrine of conduction units is a noteworthy attempt to meet this difficulty, but in the end we are obliged to fall back on some sort of guidance outside of the organism, a guidance that involves control or direction by future ends. Something similar may be said of Watson's attempt to explain thinking in terms of verbalization. Though verbalization undoubtedly plays an important rôle in thinking, we are still left with the problem how it is that words fall into their appropriate places so as to give us a "conclusion" or "inference." This is precisely the same sort of problem as the problem of combining a number of conditioned reflexes into "intelligent" behavior. Suppose we have the verbalization, "A is north of B and B is north of C," how do we evolve out of this statement the conclusion that A is north of C? The words in themselves have no such

[6] Quoted by Ward, J., *Naturalism and Agnosticism,* Vol. I., p. 140. A. & C. Black.

magic power. Some process of "construction" must supervene, either as an image or as something else, which places A, B, and C in appropriate spacial relations and this "construction" must be guided by an end. The same may be said of ordinary conversation. We begin with the intention of saying something, and the sentences shape themselves up as we go along. We may be completely in the dark as to how the end or purpose operates or what constitutes a purpose anyhow, and yet be entirely convinced that an account of purpose in terms of conditioned reflexes is Hamlet with Hamlet left out.

Behaviorism has undoubtedly rendered a notable service to psychology in challenging the assumption of mental states and in limiting the claims of introspection. But it has not succeeded in proving its contention that physical behavior tells the whole story, or even in making this contention intelligible. Historically it represents a reaction against the doctrine of mental states. If we concede that this doctrine is an outworn creed, the psychology of behaviorism naturally looks inviting. But the difficulties of behaviorism seem to compel a return to mental states; and so the seeker after truth is driven from pillar to post. If he finds it impossible to become reconciled to either position, his only recourse is to start all over again. It is just possible that all this trouble arises from the dualism with which we started. If so, then there can be no peace until we have reconsidered our conceptions both of mind and of matter.

In brief, then, the present dilemma of psychology arises from the fact that it cannot do business on the basis of traditional "mind" or of traditional "matter," nor yet on the basis of the two put together. With the

exception of the behaviorists, most psychologists show a disposition to stay away from "fundamental" problems and to occupy themselves with special investigations. There are, however, indications of a new approach to the problem of purposive behavior. These attempts to gain a new outlook are of great theoretical and practical importance and will be considered in succeeding chapters.

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CHAPTER XIII

ANOTHER VIEW OF PURPOSIVE BEHAVIOR

Up to the present time the attempts to reduce purposive behavior to terms of mechanism have not been successful. Even if we should be able to equip a human body with all the reflex mechanisms imaginable, there would still remain to us, as we have seen,[1] the problem of making these reflexes combine appropriately so as to meet the exigencies of the particular occasion. Some of these reflexes must be kept from responding to the stimulations of the environment, and those which should come into play must operate to the right degree and in the right order. Thus the Romeo of our previous illustration must not climb trees or go swimming while he is on his way to Juliet, which his reflexes might prompt him to do unless there is some way of inhibiting them. Moreover, if he taps on the windowpane or gives some other signal, he must be loud enough to be heard, but not loud enough to rouse the entire household. How loud his signal should be, how he had best approach the house, how his procedure should be varied when he encounters obstacles, are all matters which must be provided for in some other way. The reflexes, if left to themselves, are unequal to the task.

It is for the purpose of meeting this difficulty that Thorndike introduces the "conduction unit." The or-

[1] *Cf.* Chapter XI.

ganism has a certain antecedent " set " which shuts out the irrelevant responses and keeps it on the right track. But the conduction unit likewise proves inadequate. The mere release of the activities for which the body is " set " is not sufficient; if it were, our Romeo might engage in giving his signals while he was still on the way, and have all that done before he had even arrived. Besides, he must be able to extend the area of his activities whenever unforeseen circumstances arise, and these new activities must be of a kind to forward the business in hand. It is difficult to see how all these conditions can be met unless the environment itself, in some fashion or other, guides or controls the organism so that the ultimate result or goal will determine what is to be done throughout a succession of shifting and novel situations. It is useless to pretend that we have any mechanical explanation which, so far, is even remotely adequate to the conditions of the problem.

In this connection it may be recalled that Thorndike accounts for the " learning " of his experimental animals in a way that makes it unnecessary to assume any " insight " or " understanding." The correct reaction is at first made by chance and is then repeated more and more readily until all other reactions have been eliminated. In the end the connection between stimulus and response becomes so intimate that the behavior becomes akin to that of an inborn reflex. It is no more necessary to assume a " comprehension " or " perception " of relations in this case than in the case of any of our reflexes.

When we turn next to the consideration of human behavior we seem to come upon something different. Human beings have the power to " isolate and respond to

elements which for the lower animals remain inextricably imbedded in gross total situations," and it is by this process of isolating elements that ideas are formed. Pulling a string or pressing a button, for example, is such an element. The lower animals can, indeed, learn to respond to such elements, but they cannot isolate them. Consequently they are less able to carry over what they have learned into new situations. "Animals do not, as a thoughtful man might do, connect the response with perfect strictness to the one essential element of the situation." [2]

This ability to "connect the response with perfect strictness to the one essential element of the situation" is apparently the trait that constitutes man's intellectual superiority over the lower animals. It constitutes "insight" or "comprehension" and makes it possible for a man to achieve results without the random fumbling that characterizes animal learning. Habits of response to abstractions "give man his power over nature and himself. They are the most important habits to be formed by education — the essence of human learning." [3]

This difference between human and animal learning, it appears, means that human beings have "insight" or "comprehension," whereas animals do not. Animals do not "understand" because they do not connect the response with the "one essential element." Their responses are made automatically, as winking follows a loud, sudden noise. Animals cannot deal with abstractions, like redness, threeness or triangularity. A human

[2] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 134. Teachers' College.

[3] Thorndike, E. L., *Education,* p. 100. The Macmillan Company.

being, on the other hand, can learn to isolate a quality like triangularity by tying up definitely with this quality certain responses, such as the response for the word "triangle" or the response for "three-sidedness." Animals cannot deal with abstractions, and they cannot even isolate a physical part of a given situation, such as the string that is to be pulled or the lever that is to be pressed, and associate definitely with that particular object a specific response. Because of this inability, they never understand what they are doing. Their first random responses are made to the situation in general, more or less like those made by a man who suddenly falls into the water without being able to swim. In the course of time the inappropriate responses are eliminated in animal "learning," but the type of behavior remains the same.

This doctrine offers what appears to be a reasonably definite contrast between human and animal learning. This contrast, however, becomes less clear-cut when we go into details. Perhaps animals are unable to single out the "one essential element" in the situation, yet it seems fairly evident that, even in the case of animals

> "One or another element of the situation may be prepotent in determining the response. . . . Thus it makes little or no difference whether the box from which the cat has learned to escape by turning a button is faced North, South, East or West; and not much difference if it is painted ten per cent blacker or enlarged by a fifth. The cat will operate the mechanism substantially as well as it did before." [4]

If we follow out this lead, we seem forced to revise the original doctrine. The difference between human beings

[4] Thorndike, E. L., *Educational Psychology* (Briefer Course), p. 134. Teachers' College.

and animals now turns out to be a difference of degree and not a difference of kind. To some extent or in some degree animals as well as men resolve situations into their elements.

"A cat that has learned to get out of a dozen boxes — in each case by pulling some loop, turning some bar, depressing a platform, or the like — will, in a new box, be, as we say, 'more attentive to' small objects on the sides of the box than it was before. The connections made may then be, not absolutely with the gross situation as a total, but predominantly with some element or elements of it. . . . Even in the lower animals, that is, we find that the action of a situation is more or less separable into the action of the elements that compose it . . . that a part or element or aspect of a situation may be prepotent in causing response, and may have responses bound more or less exclusively to it regardless of some or all of its accompaniments."[5]

These admissions express a commendable attempt to maintain scientific objectivity, but they spoil the sharp outlines of the picture. If cats react in this fashion, what becomes of the original contrast between human and animal learning? Human beings doubtless have a much greater capacity for analysis, but, so far, the difference is simply a difference of degree. In the face of the evidence it seems that we must either credit cats with some measure of insight or comprehension, or else we must deny the quality of insight to human beings as well.

If this inference is sound, it appears that we are confronted by a dilemma. To credit the cats with "insight" is awkward, for the reason that we are then under obligation to explain what is meant by insight. We are not free to introduce a mental state as the embodiment or

[5] Thorndike, E. L., *Educational Psychology* (Briefer Course), pp. 134, 135. Teachers' College.

carrier of the insight, because that would mean a return to a discarded hypothesis. Thorndike's explanation of animal learning appears at first to be significant, for the reason that it enables us to account for what takes place without having recourse to such dangerous notions as "insight." Everything is accounted for in terms of physiological habit. But when we stop to note that the denial of insight to cats commits us to the same denial when we come to human behavior, the situation is equally awkward. We certainly have the experience of insight or we should not be talking about it. Perhaps the experience is a delusion, but it is undeniably present as an experience. What are we to do about it? Since mental states are barred, our only recourse apparently is to reduce what we call insight to a form of physical movement, after the manner of behaviorism.

The reason why Thorndike does not face the issue squarely is apparently to be found in his mode of procedure. At the outset he was concerned only with the comparison of cat intelligence with human intelligence. When he found that the cats could not solve the problems with which they were confronted, he drew the conclusion that cats are not intelligent in the sense in which human beings are intelligent. Cat learning is regarded by him as a mechanical process; or in Koffka's phrase, the animal does not participate in the learning. But then Thorndike proceeds to argue that human learning is fundamentally the same sort of learning as cat learning; which is to say that human learning is not intelligent either. It is a mechanical process with human beings in the same way as with the cats. At this point the reader is naturally puzzled to know which shell the pea is under. First the

performance of human beings is used to condemn the cats. Then the performance of the cats is used to condemn the humans. This looks like playing both ends against the middle.

It is no wonder, then, that the disposition has developed to take another look at the facts on which Thorndike rests his case regarding the nature of learning. In particular, various writers have made a critical examination, during the past few years, of the experiments in animal learning conducted by Thorndike. It has been pointed out that Thorndike's original purpose in making these experiments was to ascertain the degree of truth in the popular belief that certain animals, particularly domestic animals, are possessed of a considerable degree of intelligence. It is well known that people who keep pets are inclined to rate their mental qualities very highly. Thorndike accordingly arranged for experiments which were intended to test the capacity of these animals for grasping causal relationships. In his experiments with the cats he placed the animals in a cage from which they could escape only by manipulating the mechanism in a certain way. The purpose of the experiments was to test the aptitude of the cats for "catching on" to the relation between cause and effect in the handling of the mechanisms.

It is important to note that no attempt was made in these experiments to devise apparatus so simple that the cats might conceivably understand it. On the contrary, it was complicated enough to puzzle even a normal human being. In order to escape from the cage the cat would have to perform some act which it could not possibly figure out in advance, but would have to discover by ac-

cident. That is, it could discover the right act only on the principle of trial and error. What Thorndike was concerned to discover was how long it would take the cats to discover the significance of the act, which at first was performed in a purely random way. If they possessed only a small part of the intelligence which people ordinarily ascribe to them, they might be expected to seize upon the connection of cause and effect and so repeat the right response the next time without undue fumbling. For example, if the release requires the pulling of a string, one might expect that the animal would learn after two or three successes to pull the string at once when it was placed in the cage.

The results of the experiment were very different from this. What actually happened was that the period of fumbling gradually decreased, so that the right response became firmly associated with the situation only after a relatively long series of trials. It is suggested, therefore, that the animal never really comprehended the relation of cause and effect at all, but that the right response, when it was finally established, was only a mechanical association.

This inference, however, would not be altogether warranted, as is shown by Ruger's experiments with human beings. The experiments conducted by Ruger had to do with the solving of mechanical contrivances, such as disengaging interlocking rings. Ruger found that at the outset success depended on trial and error, as in the case of the cats. Moreover, the successful solution of the problem did not mean that the subject was then able to repeat the solution the next time without fumbling. The chief difference seemed to be that the subject knew somewhat

better the general area within which the solution must be sought; in other words, he knew better what not to do. As the experiments were repeated, the time interval was gradually shortened, in much the same way as with the cats.

It appears then that the gradual slope of the learning-curve leaves the way open to either of two inferences. One is that the cats never really learn anything at all, in the sense of perceiving a relation of cause and effect between two different things. They do not learn any more than a river " learns " to flow in a different bed. The experiment has the effect of establishing different connections in the nervous system, and that is all. The other inference is that the cats do perceive a causal connection, just as human beings do, but that this connection is at first very vague and only gradually becomes definite. On this hypothesis the cats learn in much the same way that a man may learn how to unlock a door by manipulating the key in a certain way while exerting a certain specific pressure on the door at the same time. Such learning is frequently gradual and does not necessarily come all at once. Thorndike's experiments show clearly enough that the cats do not have sufficient intelligence to handle the situation with economy of effort; they do not show conclusively that the cats have no intelligence, nor do they indicate clearly how much intelligence, if any, the cats really do possess.

The suspicion that the experiments do not warrant the uncomplimentary inference as to animal intelligence is deepened by the fact that on those occasions when the situation was apparently simple enough to come within the comprehension of the animal, there was a sharp drop in

the time-curve, such as was to be expected if the animal really grasped the relation of cause and effect. Thorndike's explanation of such results is hardly satisfactory. He says: "Of course where the act resulting from the impulse is very simple, very obvious, and very clearly defined, a single experience may make the association perfect and we may have an abrupt descent in the time-curve without needing to suppose inference." It seems odd to explain the ease with which an association is made by saying that it is "obvious" and at the same time to maintain that it has nothing to do with insight. As Koffka points out:

> "The position he takes is open to objection because the description of a solution as 'simple,' 'obvious,' and 'clearly defined' can apply only to the experimenter and not to the animal. According to Thorndike's own presupposition, the animal does not participate at all, nor does it even understand the solution after it has been mastered; and hence there can be no point in saying that the solution 'is obvious to the animal.'"[6]

Thorndike's experiments were undoubtedly very useful as a counter-irritant to the lazy disposition to explain learning, whether animal or human, by ascribing it to the action of "intelligence." It is needful to recognize that "intelligence" or "insight," designates, not an explanation, but a problem. Is there a way of learning other than that described by Thorndike, and if so what is its nature? Our task, then, is first to consider the evidence for this kind of learning, and secondly to venture upon an interpretation of it.

It is at this point that Koehler's work with apes is of

[6] Koffka, K., *The Growth of the Mind,* p. 165. Harcourt, Brace & Company.

importance. Koehler's experiments differ from those of Thorndike in that the situations were kept much more nearly on the "animal level." The problem with which the ape was confronted presented some sort of difficulty, of course, but the difficulty was not, as in Thorndike's experiments, of such a kind that it could be overcome only by accident. On the contrary, the problem was so selected that the ape would at least stand a chance to "figure out" the solution. That is, the difficulty was relatively simple, yet it required some sort of new adaptation of means to ends, such as fetching a box for the purpose of standing on it so as to reach an object overhead.

> "The experiment provides a situation in which the direct way to a goal is barred, but in which an indirect way is left open. The animal is introduced into this situation, which has been so planned that it is fully comprehensible. The animal is then left to indicate by its behavior whether or not it can solve the problem by the indirect means that have been provided." [7]

It is not necessary for our purpose to do more than to make brief mention of some of these experiments. In one experiment, fruit was placed beyond reach outside of the cage, but a string was attached to it which was in easy reach; in another there was no string, but a stick was placed inside the cage with which the fruit could be reached. One variation of this experiment consisted in placing in the cage, not a stick, but a part of a dead tree from which a branch could be broken off to be used as a stick. In another variation two bamboo sticks had to be fitted together by inserting one into the hollow end of the

[7] Koehler, W., *The Mentality of Apes*, p. 4. Harcourt, Brace & Company. Quoted by Koffka, K., *The Growth of the Mind*, p. 181. Harcourt, Brace & Company.

other so as to make the stick of adequate length. In still another experiment the fruit was hung from the ceiling of the cage, but so high that a box which was in the cage had to be placed under it. As a variation of this experiment the box was filled with stones which had to be taken out before the box could be moved. Again the fruit thus suspended could be reached by swinging towards it with a rope, which was likewise suspended from the ceiling at a distance of two meters. In a subsequent experiment the rope was laid on the floor, and it had to be replaced on the hook — which was accessible to the ape — before it could be used for purposes of swinging.

In struggling with these situations the apes naturally made errors, some of which Koehler calls "clever," and others he labels "stupid." For example, on one occasion an ape brought in a box and placed it against the wall above the floor where it was in a position from which the fruit could easily be reached, if only the box could be made to stick to the wall. Koehler calls this a clever error because it showed a comprehension of the problem, even though an essential factor had been overlooked. This epithet applies also to the procedure of the ape who tried to obtain the fruit by means of two short sticks, his method being to lay the two sticks endwise, instead of inserting one into the other; so that by pushing with one of the sticks he made the other stick come into contact with the fruit. In this way the ape succeeded in reaching the fruit with the sticks, although this did not help him in bringing the fruit into the cage. By contrast a stupid error is illustrated by the behavior of a cat in Thorndike's experiments. The cat had learned to pull a string so as to release itself from the cage; and having learned this

it went to the same spot and made the motion of pulling the string, in spite of the fact that the string had been hung in another part of the cage.

It may be remarked that the methods by which the apes sought to solve their problems were sometimes quite unexpected. In one instance the two sticks to be fitted together were too nearly of the same size, so the ape proceeded to whittle down the end of one stick with his teeth, apparently for the purpose of making it fit. This resulted in his breaking off a large splinter, which caused a change of plan. The splinter was inserted into the other uninjured end of the pole, which made it long enough to serve the purpose of reaching the fruit. On another occasion the ape led the keeper by the hand under the fruit, with the evident intention of using the keeper as a step-ladder by climbing on his shoulder, as he had done on previous occasions. This time, however, the keeper knelt down at the critical moment, so that, after the ape had climbed up, the fruit was still beyond reach. The ape, as Koehler tells the incident, " climbs on to the man's shoulder after he has dragged him underneath the object, and the keeper quickly bends down. The animal gets off complaining, takes hold of the keeper by his seat with both hands, and tries with all his might to push him up. A surprising way of trying to improve the human implement." [8]

With one exception, all of the experiments mentioned, and others besides, were successfully performed by some one or more of the apes. As was perhaps to be expected, some of the apes proved to be distinctly superior to others

[8] Koehler, W., *The Mentality of Apes*, p. 146. Harcourt, Brace & Company.

in intelligence. The experiment in which all the apes failed required that a rope lying on the floor of the cage be hung on a hook in the roof of the cage so that it might be used as a means of swinging the animal within reach of the fruit. In these experiments there was no gradual sloping downward of the time-curve. Ordinarily the successful performance meant that the animal was master of the situation at once. He could do the right thing on the next occasion with a minimum of fumbling. In terms of curves, his learning was represented, not by a gradual downward slope, but by a straight drop.

It is of interest in this connection to observe that the experiment in which stones had to be taken from a box before the box could be moved was performed in a way that exhibited a curious limitation of insight. Instead of removing all the stones, the ape took out only as many as were necessary to make the box movable. The labor involved in moving the box with a quantity of stones still left inside was considerable, but the ape apparently did not grasp the fact that his labor would be lightened by the removal of the remaining stones. The stones were regarded as an obstacle to moving the box only as long as the box was too heavy to move. As soon as the box was movable, the remaining stones were ignored.

Now comes the task of interpretation. The behavior of the apes was of the kind ordinarily called purposive. In some sense or other the animals were "set" for a certain result, *viz.*, the securing of the fruit. This was indicated by the fact that changes in circumstances were matched by such changes in activity as were necessary to achieve the end. Moreover, the learning of the apes was not a process of gradually "stamping in" an association.

When the solution of the problem was once discovered, the apes ordinarily knew just what to do the next time, without any beating about the bush. What is the explanation of this unique factor which we call " insight " or " comprehension " ?

For reasons already indicated, we cannot dismiss " insight " by ascribing it to the act of a " mind." Neither can we limit it to a change in neural organization or neural connections. The explanation of behavior calls for something more than changes occurring in the nervous system, but this " more " is not a " mind " or " consciousness." If this is a correct statement of the problem, then obviously there is left but one remaining alternative, *viz.*, that the environment in some way takes a a hand in directing the activities of the organism.

This undoubtedly has an appearance of mystery. What is there for the environment to do except to supply such stimulations as are described by physics? To discover an additional function, let us note what takes place when the light breaks in on a problem. To use the vernacular, the animal " tumbles " to a situation; he " has a hunch " or it " dawns " on him that a stick, for example, can bring the fruit within reach. Some recent writers maintain that these terms describe a change which takes place in the stick itself. In Koffka's language:

> " As a necessary condition for a correct type of behavior an *alteration must occur in the object of perception.* What at the beginning possessed only the character of ' indifference,' or ' something to bite upon ' etc., now obtains the character of a ' thing to fetch fruit with.' " [9]

[9] Koffka, K., *Growth of the Mind,* p. 191. (Italics in original.) Harcourt, Brace & Company.

Changes of this kind are common enough in experience. We all know that a city visited for the first time looks different from what it does later when we have lived in the place for a while; that puzzle pictures undergo surprising transformations after we have learned what to look for in them; that illusions fairly "flop over" into something else when we manage to get a correct view. The whole trend of modern psychology has been towards the view that experienced objects and reactions vary concomitantly. Hence alterations in the objects of perception may be regarded as a commonplace.

It will be objected, perhaps, that this is after all only an attempt to reintroduce mental states. The objective fact, to wit, the stick, does not undergo any change; consequently the change, if change there be, must be "in the mind." Perhaps we had better not be too sure in advance of what the change really imports. It may be good procedure to commit ourselves to nothing at this point, but to follow as far as possible the lead of the subject matter. Objects as perceived certainly do undergo changes; about that there can be no dispute. To say that these changes are "really" changes entirely within the nervous system or entirely within the "mind" is to venture on dangerous territory.

Our point of departure, then, is the proposition that the environment as perceived changes concomitantly with changes in bodily reaction. The bodily reaction that takes place in a normal experience comprises a complex of responses, some of which are overt, but many of which are not. The entire complex constitutes a temporary unity, in the sense that the various elements — reflexes and habits — tend to modify one another so as to result

in an activity of an adaptive kind. Consequently these elements are not what they would be if they occurred alone or if they occurred as parts of a different complex. Each elementary reaction is modified by the other reactions that are going on simultaneously, as the course of a baseball is modified by air currents or dust or the moisture of rain or fog.

What takes place in the environment as perceived by the individual is entirely parallel. Sounds, for example, are modified by other sounds occurring simultaneously. Thus:

> "Membership in a clang alters the phenomenal character of the partial tones. We do not hear the partials as loudly as we would if they were separate and distinct tones. In spite of the identical physical conditions, a sound is less intensive when it is a member of a clang than when it exists independently. A phenomenal *configuration,* such as a clang, is both something more than and something different from the sum of its ingredients; for these ingredients are no longer separable entities, but members of a 'whole,' and being such they must lose some, indeed a great deal, of their individuality." [10]

The assertion that things which are experienced together modify one another contains nothing that is very novel. We all know, for example, that it makes considerable difference in the sound of music whether we happen to be eating our dinner leisurely or have a bad headache or are trying to go to sleep. The context makes all the difference in the world. This fact, however, has a special significance in the present connection, because it seems to offer a suggestion how things may acquire new meanings. In Koehler's experiments the apes already had a certain

[10] Ogden R. M., *Psychology and Education,* p. 150. Harcourt, Brace & Company.

familiarity with sticks. The sticks were things to play with or "to bite upon." In other words, the given stick had a certain appearance because it was correlated with the reactions of playing or biting. Under the conditions of the experiment, however, a different set of reactions were under way. The sight of the fruit set off reactions of jumping, reaching, grasping, and the like. When the stick is seen under these conditions, it is provided with a new context. The reactions of playing and biting are held in check because the animal is in a state of disturbance. Consequently either of two things may happen. The ape may ignore the stick and continue to devote his attention to the fruit. Or, secondly, the appearance of the stick may be transformed, as a result of the new conditions, so that it is suddenly seen as a "thing to fetch fruit with." In this case both the stick and the situation to which the stick has been added become made over. The reactions of the ape are "set" for obtaining the fruit, and the stick is changed in such a way as to organize these reactions into adaptive behavior. The stick becomes an implement and the situation as a whole loses its character of "puzzling" or "annoying." There is a qualitative change in the situation and in its parts, including the stick, analogous to the change that takes place when different elements combine to form a new chemical compound. The stick, as we say, has acquired a new meaning.

This mode of interpretation is at present advocated by the psychology which has become known in recent years by the formidable name of *Gestalt-Theorie*. The word *Gestalt* has been rendered into English, somewhat clumsily, as *configuration*. In terms of the preceding illustration, the stick, as long as it has been seen as something

to play with or to bite upon, has its place in a certain configuration; and it becomes seen as "a thing to fetch fruit with" because it is incorporated in a different configuration. This configuration is the experiential counterpart of the bodily "set." It is not easy to give a satisfactory definition of the term configuration. According to Koffka, an adherent of the theory, a configuration is "a coexistence of phenomena in which each member 'carries every other' and in which each member possesses its peculiarity only by virtue of, and in connection with, all the others." [11] The interesting and important feature of the theory is the fact that it gives an interpretation of purposive behavior which avoids both mental states and outright mechanism. It does this by ascribing to objects certain changes which maintain a point-for-point correspondence with the changes that take place in bodily reactions. What we call "insight" or "comprehension" is a certain transformation or reconstruction of things, and this reconstruction is at the same time a reorganization of the reactions with reference to adaptive behavior. This transformation has the quality of creativeness, in which it resembles the changes that take place in a chemical process. The following instance is a case in point:

"One of the animals, Chica, strove with all her might to attain a goal suspended from the roof, without ever using a box which stood in the middle of the room, although she had already mastered the use of boxes in similar tests. It could not be said that the box was overlooked, for the animal repeatedly squatted upon it when she was out of breath, and yet she made not the slightest effort to bring the box under the goal. During the whole time, however, Tercera, another ape, was lying on the box; when at length Tercera

[11] Koffka, K., *The Growth of the Mind,* p. 131. Harcourt, Brace & Company.

chanced to fall off the box, Chica grasped it immediately, carried it under the goal, and mounting it snatched down the food. From this behaviour it may be inferred that the box upon which Tercera was lying was not an 'object with which to fetch the goal,' but 'something upon which to lie.' Consequently the box simply did not come into connection with the goal so long as it possessed a definite configuration of its own that made it inappropriate as a tool in another situation. To release a thing from one configuration, and transfer it by reconstruction into another configuration, would seem to be a relatively high-grade accomplishment. Nor is this difficulty confined to chimpanzees; on the contrary, it plays an important part in human thought. For instance, when you have need of a shallow dish, it might never occur to you that you could use the cover to a pot, unless such a cover happened to be lying before you on the table, away from the pot, in which case you would probably make use of it at once." [12]

This explanation of learning obviously implies a very different procedure or placing of emphasis from that of Thorndike. The central feature of learning, from this point of view, is reconstruction, synthesis, building up, and not merely a process of analysis. Its chief reliance, accordingly, is on the cultivation of this power of construction, and not on habit or drill. Thorndike's laws of learning — the law of use, the law of disuse, and the law of effect [13] — are laws of habit-formation and nothing more. If we give a place to "insight" in the learning process, these laws become of subordinate importance. The core of the learning process is not habit, but intelligence.

This new approach thus represents a point of view that is full of significance for educational theory and

[12] *Ibid.*, p. 196.

[13] Thorndike, E. L., *Educational Psychology* (Briefer Course), pp. 70, 71. Teachers College.

practice. So far, however, it is mainly an approach. It implies, but does not present in any detail, a new doctrine of stimulus and response. We need to know more about the relation of stimulus and response so as to understand how the conflicting responses manage to unwind themselves in an orderly and adaptive sequence of acts, instead of remaining in a state of mutual inhibitions. The mode of procedure in purposive behavior must be elaborated before we can consider ourselves out of the woods.

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CHAPTER XIV

THE RELATION OF STIMULUS AND RESPONSE

In the preceding chapter it was intimated that the explanation of purposive behavior requires a revision of the prevailing conception of stimulus and response. The whole discussion up to this point may be said to deal with the problem of purposive behavior. This form of behavior is explained by one type of psychological theory as due to the intervention of a substance called mind or as due to the action of mental states. Behaviorism explains purposive behavior by explaining it away. If we take a look at these divergent explanations from the standpoint of what they teach regarding the relation between stimulus and response, we find considerable ground for the belief that the misconception of this relationship is the primary cause of all the trouble.

For the sake of simplicity we shall confine the discussion of stimulus and response in the present chapter to the level of perceptual experience. According to the usual doctrine of the soul substance theory and the theory of mental states, perception is preceded by the stimulation of some sense-organ. This stimulation is transmitted to the cerebral cortex, where it arouses a perception. This perception marks the beginning of conscious experience and is identified as the stimulus. The excitation in the nervous system then continues from the cerebral cortex out into the nerves governing the muscles of the

body. Everything that comes after the occurrence of the sensory experience which is called forth in the cerebral cortex is labelled response.

In this account the course traversed by the neural excitation consists of three parts. First we have the afferent nerves, then the central area, and lastly the efferent nerves. These different portions are stimulated successively so as to produce conscious behavior, and together they constitute what is sometimes referred to as the reflex arc.

This explanation has a certain simplicity and plausibility, but it is obviously connected with the difficulties that were discussed in the preceding pages. The perception aroused in the cortex is separated from the object that it is supposed to represent, and we find ourselves entangled in the toils of dualism. We have at once the problem of holding mind and matter together in some way, but the relationship is so precarious that it is constantly being upset. There seems to be no way of compelling mind and matter to keep the peace.

The merit of behaviorism is that it appreciates the hopelessness of trying to drive such a team as this. Accordingly it gives us a different explanation of the relation between stimulus and response. The account which it gives is even more simple. First we have an excitation of the sense-organ, by ether-waves or sound-waves, or what not, and this is called the stimulus. Everything that happens in the body as the result of this excitation is called response.

This explanation avoids the perils of dualism but commits us in advance to a thorough-going mechanism. The stimulus in this scheme merely presses the button and then

its work is done. Common sense is disposed to take for granted that our behavior is directed by what we see and hear. We see the bear and run; we hear the muttering of the approaching storm and call the children home. According to mechanism, however, this is not what happens. The visual stimulus consists of ether-waves, and not of sensory qualities. We do not see these waves, any more than we hear the sound-waves impinging on the eardrum. The things seen and heard, regarded as sensory qualities, are a kind of by-product; it is the excitation produced by the ether-waves or sound-waves that does the business. If this is the case, then human behavior is as unmistakably and inescapably mechanical as a landslide or a cloudburst.

Whichever way we turn, our escape seems to be cut off. The whole perspective changes, however, if we find reasons for believing that both types of doctrine present an erroneous explanation of the relation between stimulus and response. Such reasons are at hand. The pioneer work here was done by John Dewey, who wrote a searching criticism of the conventional notion of stimulus and response, more than thirty years ago.[1] Dewey makes the contention that the traditional conception of stimulus and response oversimplifies the facts, and, consequently, is thoroughly misleading. Since behaviorism had not yet appeared as a psychological movement at the time that Dewey wrote, and since the soul-substance theory had already passed out as a live issue in psychology, he confined his attack, in the main, to the explanation of behavior furnished by the theory of mental states. This view, as stated a moment ago, is briefly, that the stimulation of the

[1] Dewey, J., "The Reflex Arc Concept," *Psychological Review,* Vol. III, p. 357.

sense-organ is first conveyed to the cerebral cortex, where it arouses a sensory experience, and then continues into the efferent nerves which produce the response. In opposition to this view, Dewey argues that such events as seeing and hearing take place because there is already a response going on. This response is necessary if seeing or hearing is to occur; the response is not a consequence of the sensory experience but is an antecedent or condition of it.

> "There is a certain definite set of the motor apparatus involved in hearing just as much as there is in subsequent running away. The movement and posture of the head, the tension of the ear muscles, are required for the 'reception' of the sound. It is just as true to say that the sensation of sound arises from a motor response as that the running away is a response to the sound."[2]

The view for which Dewey contends is that sense-perception is not a passive affair, but involves an activity on the part of the organism. Seeing, hearing, smelling are things that we *do*. Not only so, but the doing determines what we shall experience. A person who does not understand the rules of football simply cannot see what is going on; he is not "set" to see the plays which an expert notices and reads off at a glance. In Thorndike's language, it is all a matter of conduction units or antecedent "sets" of the organism, which, by their operation determine the nature of the perception. If we go to the railroad station to meet a friend, we pick him out of the crowd; if we are hungry, we notice restaurants and the smell of foods; if we are sensitive to slights, we notice all sorts of slight facial expressions on the part of others. It is very difficult to see the face hidden in a puzzle picture

[2] *Ibid.*, p. 362.

until we have discovered it, and afterwards it is very difficult not to see it. Illusions occur because we are "set" to see something that is not there. The facts are commonplaces, and they are all in line with Dewey's view that the beginning of conscious experience is as much a response as the termination of it is a response.

To say that perception is determined by an antecedent "set" is to say that the organism is already active before the perception arrives. We have perceptions because there are activities under way, and the perceptions are seized upon as possible opportunities for the expression of these activities. If a person is very hungry, for example, his senses are on the alert and he is quick to respond to anything that may have to do with eating. Instead of waiting passively for stimulations to come, the organism seeks them out. All sorts of sights and smells that would ordinarily pass unnoticed are responded to and made much of. Thus a faint smell is laid hold of and transformed into visions of cookery; a slight noise is transformed into a dinner call, and so on. Similarly the craving for excitement in small boys translates all sorts of ordinary objects into opportunities for creating a disturbance, with a facility or ingenuity that to older people often borders on the diabolical. The particular "set" creates a high degree of sensitiveness or readiness to react; in psychological terms, the threshold of sensitivity is low. If a person has just had a good dinner, or if he is tired, this sensitivity undergoes a change; the opportunities to eat or to create excitement tend to pass unnoticed. The threshold of sensitivity is then high. In other words, the organism is no longer in search of stimuli that can be made over into objects which will further the organic activities.

Another instance of the same sort is furnished by our responses to physical injuries. Ordinarily we are quick to notice them, because the organism is on the alert and ready to take defensive measures. It may happen, however, in the heat of battle that men receive fatal wounds with scarcely any awareness that they have been hurt at all. Under such circumstances the threshold of sensitivity to injuries is high. If we identify the stimulus with the perceived object, we cannot say that the stimulus calls forth the response. The response is already present. It would be more nearly correct to say that the stimulus is just an opportunity for the response to express itself more adequately.

> "Conduct originates in the organism itself and not in the environment in the form of a stimulus-response. We should analyze it as the expression of cravings that originate in the organism and find particular modes of satisfaction in the stimuli that happen to be available." [3]

The conception of the living organism as spontaneously active is basic for an adequate understanding of behavior, from the standpoint both of psychology and of education. What Jennings says of the lower forms of animal life is applicable to every form of animal life. According to Jennings:

> "Activity does not require present external stimulation. A first and essential point for the understanding of behavior is that activity occurs in organisms without present specific external stimulation. The normal condition of Paramecium is an active one, with its cilia in rapid motion; it is only under special conditions that it can be brought partly to rest. Vorticella, as Hodge and Aikins showed, is at all times active, never resting. The same is true of most other

[3] Thurstone, L. L., *Psychological Review,* Vol. XXX, p. 368 (1923).

infusoria and, in perhaps a less marked degree, of many other organisms. Even if external movements are suspended at times, internal activities continue. The organism is activity, and its activities may be spontaneous, so far as present external stimuli are concerned. The spontaneous activity, of course, depends finally on external conditions, in the same sense that the existence of the organism depends on external conditions. . . . Reaction by selection of excess movements depends largely on the fact that the movement itself is not directly produced by the stimulus. The movement is due, as we have seen, to the internal energy of the organism. . . . The energy for the motion comes from within and is merely released by the action of the stimulus. It is important to remember, if the behavior is to be understood, that energy, and often impulse to movement, come from within, and that when they are released by the stimulus, this is merely what James has called 'trigger action.'"[4]

The dependence of visual perception on bodily response is further indicated by an interesting experiment performed by Professor George Stratton. This experiment had to do with the relation between the responses of the body and the spacial relations of perceived objects.

"Stratton in this experiment placed before one eye a system of lenses which made things appear upside down and with reversed right and left relations. The other eye was blindfolded. These lenses, of course, caused the eye-muscle coördinations which Stratton had built during his lifetime to function unsuccessfully. That is, at the beginning of the experiment, movements which were performed unthinkingly and automatically ceased to produce the customary results. After two or three days there were brief intervals during which he had no difficulty in making appropriate movements. The best way to describe these intervals is to say that everything looked natural and there were no questions of right or left, or up or down. But as soon as a blunder or hesitation

[4] Jennings, H. S., *Behavior of Lower Organisms,* Chapters XVI and XVIII, pp. 283, 284, 303. Columbia University Press. Quoted by Thurstone, L. L., *ibid.,* p. 367.

occurred, *i.e.*, as soon as the new habits ceased to function automatically, the scene looked upside down again. In eight days Stratton acquired a new and adequate set of eye-muscle habits. And on the eighth day the scene *looked* as natural, as right-side up, as it did before he began the experiment." [5]

The adjustments that had to be made in this experiment will be appreciated by anyone who can recall the struggles that he had to make when he first undertook to shave or to tie the proper knot in a bow tie before a mirror. Our next task is to trace the bearing of the view that all conscious experience begins with a response. First of all, we gain a new clue for the interpretation of sense-perception. Let us start with our previous conclusion that visual perception, for example, is not reducible to movements.[6] The *quality* of what is seen is what it is and is not something else. This quality — color, brightness, spacial position, or what not — is correlated with the response of the organism. As the one changes, so the other changes also. How or why this is so we do not know. This correlation between sensory quality and bodily movement can, no doubt, be converted into a profound mystery, but this is due in part to the fact that the discovery of the correlation comes as a kind of shock. The unreflective person is disposed to take seeing for granted; familiarity with the act of seeing tends to make it seem simple and self-evident. In discovering the correlation we discover at the same time that we know painfully little about it. The same sort of shock or sense of mystery may come to us in connection with any other happening. Why, for example,

[5] Rosenow, C., *Psychological Review*, Vol. XXX, p. 199. Stratton's experiment is recorded in the *Psychological Review*, 1897, pp. 341–360, 463–481.

[6] See Chapter XII.

should friction produce heat, or how does it come about that an egg in an incubator is hatched into a chick? We may succeed in inserting an additional link in the causal chain here and there, but we are always left with a series of successive transformations for which we can ascertain no final why or how. Certain things go together, and that is about all we can say. Sensory quality and bodily reaction are as different as can be, but the two are somehow coupled together, and that seems to be as far as we can go.

In spite, however, of the fact that our insight is limited, this change of standpoint introduces an important change in perspective. As long as we assume that stimulations are conveyed to the cerebral cortex and there arouse sensory experiences before the response occurs, it is difficult to avoid the inference that these experiences are detached from external objects and are merely photographs or representatives of them. This inference is much less plausible when we start with a response. The suggestion now lies at hand that what is seen is numerically identical with the objects of the environment. That is, in visual perception we do not create duplicates or representatives of things "in the mind," but seeing is a correlation between changes in the environment and changes in the body. If the notion that seeing is a process of photography is all a mistake, what alternative is left to us? Apparently there is only one, *viz.*, that the thing seen is a part of the actual environment, expressed in terms of our responses.

If we adopt this view, we get a new meaning of relativity. Such qualities, for example, as far and near, right and left, right side up or upside down, which figured

so prominently in Stratton's experiment, have reference to a point of view. Relations of this sort are clearly relative to something; they are not absolute qualities inherent in things without reference to any observer. Nevertheless, the perceptions of these qualities are not normally a falsification of the facts. Things *are* far or near, to the right or to the left, etc., as we see them. There is no difficulty or mystery about this, unless we assume that the purpose of perception is to give us faithful duplicates. From our present standpoint there is no thought of securing duplicates. The perception gives us objects, but gives them in terms of our responses. Consequently the argument that the relativity of sense-perception proves the existence of mental states has no force.

When we examine sense-qualities we find that each group has its own peculiar and undefinable nature. Visual qualities, for example, are different from auditory qualities or from qualities of taste. The difference between sight-experiences and sound-experiences it is impossible to describe. We can only say that each group possesses its own unique nature or *quale,* by virtue of which sight is sight and sound is sound. This *quale* is doubtless in intimate connection with responses that are native to the organism. The infant has visual and auditory experiences very early in life. These experiences are very different from those of the adult, because, as we grow up, our acquired responses get mixed in with the inborn responses, so that the objects with which we have to deal eventually, as adults, come to look very different from what they did at the outset. In the end we learn to see the fire as hot, the stone as hard, the ice as cold, and the knife as sharp. Just what things look like to infants we can hardly guess.

This change in response gives a peculiar richness to sense-perception. We see the lighted firecracker as "going to explode" because the response for "explosion" is already under way and is translated into what we see. In the same way we *see* that the speeding automobile is "going to turn over," that the man is "going to strike," and that the couch is soft and comfortable. These things are not "in the mind" in the traditional sense. They are as truly "objective" as the shape and size and weight of objects. Through sense-perception future possibilities take the form of present actualities. The lighted firecracker is a thing that *is* "going to explode"; the lighted match is at this moment a thing that "will burn the fingers." Future events or possibilities thus get themselves translated into present fact.

The significance of this fact for behavior is fairly obvious. Through sense-perception it becomes possible to convert the consequences of behavior into a present reality. The match is not at the present moment in contact with the fingers. It is not inflicting any damage in the form of burns, but it is something that will burn if touched by the fingers. This "will burn" turns up in perception as a present attribute or trait of the match, which is described by saying that the match looks "hot" or "bad." As a result of this transformation, by which future results acquire the status of present fact, these future results become effective in giving direction to behavior.

An interpretation of this sort removes the objection which some psychologists have to the use of the term "meaning." If we say that a person knows that the match will burn the fingers, that he knows the meaning

of the match, or that he has the intention of keeping away from the match, we speak a language which suggests the presence of a "mind" or of detached mental states. This suggestion, however, is removed if all this is translated into a present trait or attribute of the match itself. We can then say that the person knows the meaning of the match without implying that he makes any reference to some future or more remote fact. His reaction is not to a future fact, but to a present fact. As was said a moment ago, perception brings the future into the present.

The next thing to note is how our responses become organized into adaptive behavior. The infant, as we have seen, comes into the world with a variety of tendencies or "drives" or "urges." Nature has equipped him from the outset with certain tendencies of behavior, such as grasping, sucking, kicking, crying, and the like. These reactions are fairly fixed and definite; they are adaptive, but not purposive, because the adaptation is provided for in advance by the constitution of the nervous system. We call them reflexes. Nature seems to have been more generous with the lower animals than with man in providing reflexes that will serve to maintain life. As compared with the human infant, the young of many other animals show a surprising power of responding adaptively to their environment. Thus fishes lay their eggs and in so doing terminate all their parental obligations; the young fishes are normally quite competent to shift for themselves from the moment that they come into the world. Chicks peck and run and hide, and birds sing, build nests, and migrate, without being dependent on education for the performance of any of these functions. As compared with such competency, the human infant is woefully helpless. He

is not lacking in power of response, but the responses are not so organized as to result in adaptive behavior.

The paradox of this state of affairs is that the possession of a " superior " brain seems to constitute a disadvantage. Animals lower in the scale have a certain sureness and definiteness of response which is largely lacking in the human infant. Human beings are, indeed, less bound to routine behavior than the lower animals. They have much greater capacity for doing something different from what they have done before. Their nervous systems have a greater flexibility, so that their reactions are less likely to follow just one pre-appointed path. But this flexibility makes it all the more necessary to engage in a process of organizing the responses so as to make them serve useful ends. The definiteness and sureness which the lower animals so often bring with them at birth must be acquired by human beings through a process of learning. Human beings are more dependent on purposive behavior.

This brings us squarely to the problem of purposive behavior. As was said a few pages back, we start with an organism that is already active. The activities that are already under way are determined in part by the inborn connections of the nervous system and in part by habits. As a convenient illustration, let us take a hungry boy whose attention is attracted by an apple on a tree. The fact that he is hungry makes him sensitive to stimulations that have reference to eating. The craving for food involves reactions or habits that he has established previously with reference to apples, since these have to do with eating, and so the apple on the tree catches his attention easily. The apple when seen becomes a stimulus to reaching and eating. But there are difficulties in the way.

Perhaps the apple is too high to be reached, or there is a difficult fence to be got over, or there is a dog in the yard that must be taken into account. Consequently there is a conflict of responses and need of reorganization. The manner in which this reorganization of responses is brought about is characteristic and distinctive of purposive behavior. It is accomplished through a reorganization of the perceived situation. As the boy stands and looks, he notices a shed near the tree upon which he can climb and thus circumvent the dog, or he sees a ladder in the yard that can be used for securing the apple. The whole situation is transformed. Instead of just seeing apple and adjoining shed, he sees " shed-that-can-be-climbed-to-get-the-apple-out-of-reach-of-the-dog." Psychologically this mode of perceiving the situation is as different as can be from the original perception. The stimulus is made over into something else. The ability to secure adaptation in this way is what we mean by intelligence. We reorganize the responses by reorganizing the stimulus. The fact that this reorganization of response is made on the spot and is not determined beforehand by the inborn connections of the nervous system is what distinguishes purposive behavior from the adaptive behavior that results from reflexes.

There are two factors or traits in this process that merit special mention. One is the part that is played by habit. It is evident, for example, that the suggestion of climbing the shed could not have occurred unless the boy had already acquired habits of climbing. The other is the act of reconstituting the situation into a new whole by the introduction of new relationships. The boy may never have picked apples in this particular manner before, and

so it is necessary for him to see the situation in a new way. Persons that are quick to do this are called "bright"; those who are slow are called "stupid." But whether it is done with facility or not, the act when it occurs is an act of sheer creation. Things are put together in a new relationship or according to a new pattern. The situation is continuously made over as the act proceeds. Perhaps the boy has to find a box before he can get on the shed; perhaps he needs a stick after he is on the shed in order to bring the apple within reach. The peculiarity of conscious behavior lies precisely in this progressive making over of the stimulus. This is the everlasting difference between purposive and mechanical behavior. In mechanical behavior the stimulus merely starts the activity; in purposive behavior the stimulus undergoes continuous reconstitution throughout the whole course of the activity. Both the stimulus and the response are being shaped up as the act proceeds.

This explanation obviously applies very directly to Koehler's experiments with the apes. The fruit induced movements of reaching, but these movements were blocked by the perception of the distance, which signified the presence of a conflicting reaction. All this is faithfully reflected in the perception. The fruit takes on a problematic character; it is seen as a "how-to-reach-it" kind of fruit. When a blocking of this sort occurs it leads to a widening of the field of perception and of reaction. The ape begins to look around, but without giving up the "set" towards getting the fruit. Hence the looking around is a looking that is controlled by this dominant "set"; it becomes a looking for a means to achieve the result. If the ape has sufficient capacity for making the

required coördination, then the stick or the box that he happens to see becomes "something-to-get-the-fruit-with." The stick or box is taken into the "configuration"; it becomes a part of the coördination or organized situation which represents the solution of the problem.

It is evident also that this "set" of the body which dominates the situation is the same as Thorndike's "conduction unit." If there is a "set" or conduction unit, then, as Thorndike says, "for a conduction unit ready to conduct to do so is satisfying and for it not to do so is annoying." But what constitutes satisfaction or annoyance? As Thorndike himself says, satisfyingness does not consist simply in unimpeded action. It must also result in "some one effect rather than another." Climbing the fence is satisfying to the boy, not for its own sake, but because it is "climbing-the-fence-in-order-to-get-the-apple." It is part of a larger activity that is progressively being carried out. Moreover, this activity admits of variations according as new objects present themselves, either as obstacles or as means to the end that is in view. Apart from such an end it is impossible to give a rational account of satisfyingness and annoyance. But there can be no end in view, as long as we operate with a stimulus that merely sets the process in operation, like turning on the starter of an automobile engine or dropping a spark on gunpowder. Thorndike fails to provide a stimulus that is "carried along" in the process and is continuously made over so as to guide the process to an adaptive end.

The same sort of explanation applies to very simple acts, such as reaching across the table for a cup or a knife. There is present a desire or a "set" for the object, but the activity must be organized to suit the situa-

tion. The fingers must avoid the butter, must avoid knocking the cup off the table, etc. Hence we have, on a small scale, another process of "constituting the stimulus." The situation changes continuously as the hand approaches the object and finally grasps it, and this continuous change is what differentiates the act from a purely reflex response. This peculiar relation of stimulus and response constitutes what we call mind or intelligence. Purposive behavior requires no entity called mind or mental state to explain it. It runs itself.

The failure of both the psychology of mental states and the psychology of behaviorism to provide an acceptable explanation of purposive behavior lies in the failure to take account of this peculiar change in the stimulus. Both of these positions explain behavior by providing a series of separate stimuli. Thus the seeing of an object is a stimulus to reaching, the contact is a stimulus to grasping, the grasping is a stimulus to conveying it to the mouth, and so on. This is not a purposive activity, but a succession of jerks. Even if images of reaching, grasping, and eating are present, they do not become integrated and operative parts of the stimulus. Purposive behavior requires the sort of continuity that gives to the successive acts the status of means to an end. Consequently the final act must somehow be foreshadowed in the beginning; the whole series must be a progressive coördination of activities and not just a sequence. This continuity is provided by the introduction of a changing stimulus, *i.e.*, a stimulus which leads to a successful conclusion by securing its own progressive transformation. At the outset the stimulus is not adequate to the immediate realization of the end, but is adequate for producing an activity that

will change it in the right direction. The apple on the tree does not automatically result in reaching and eating; it is a " how-to-get-it " kind of apple. Next, as a result of the looking that is induced, it becomes an " apple-requiring-the-climbing-of-the-fence "; and so on, step by step, until the result is attained. The continuity of the activity is derived from the fact that the stimulus provides for its own progressive completion. When the stimulus is completed, the purpose has been fulfilled.

As was said before, sense-perception is a very practical affair. We have no concern with things as they are " in themselves," apart from human activities. The fact that we experience things in terms of our reactions to them does indeed carry the implication that all our knowing is relative, but it offers no ground for the notion that our perceptions are existentially distinct from objects, as is taught by the doctrine of " consciousness," or that our knowledge is not " true " or " valid." We test our perceptions, not by comparing them with the " real object," as we might compare a photograph with the person himself, but by taking appeal to other perceptions. Thus an object seen as solid is seen truly if the hand bears out the testimony of the eye.

The reader will perhaps notice that in one respect this interpretation of conscious behavior is very much like that of behaviorism. The two views are agreed in the rejection of a dualistic " mind " and in the identification of what is called mind or consciousness with a form of behavior. The difference between the two positions lies in the fact that the view here presented makes conscious behavior a unique thing, whereas behaviorism denies this uniqueness. Since behaviorism has come to mean the

type of psychology that reduces all explanation to the categories of physics and chemistry, this other doctrine cannot call itself a form of behaviorism without inviting misunderstanding. The point of view here presented is part and parcel of the philosophic movement known as pragmatism; so if a provisional label is needed, it might be called pragmatic psychology. It is a psychology which justifies the application of "practical" tests to questions of truth and conduct and which, as will be shown in a later chapter, provides a new direction or emphasis for educational procedure.

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CHAPTER XV

THE NATURE OF MEANING

The nature of meaning has always been something of a problem. It is not difficult to see why this should be so. Meanings are peculiarly evanescent and wraithlike. They cannot be subjected to direct observation like colors and sounds; they seem to possess no " texture " or " substance " that we can put our finger on, so to speak, as the thing we mean when we speak of meaning. For example, the average person would claim to understand a sentence like *honesty is the best policy*. The meaning of this is present to his mind, yet if he were pressed to specify just what was in his mind at the time, except the words, he would be puzzled to know how to reply. His experience does not consist of sensory qualities or images; or if these are present they do not constitute what he calls the meaning. Yet there is nothing else except a tantalizing sense that there is something else after all.

As we have seen, each new standpoint in psychology tends to bring with it a new interpretation of meanings. The doctrine of a substantive mind says that meaning is either a sheer creation of the mind or else the common trait or attribute which the mind abstracts from a variety of things that happen to have this trait in common. The doctrine of mental states either fails to make any provision at all for meanings, as, for example, in the philosophy of Berkeley, or it explains meanings as a common ele-

ment which is secured, not by the act of an abstracting mind, but by some process of taking out the common element, such as " dissociation by varying concomitants " or through " composite photography." Behaviorism identifies meanings with movements, particularly the movements of the vocal cords. The pragmatic doctrine likewise has its distinctive view of meanings, which we must now examine more in detail.

One reason why it is difficult to distinguish between the thing and the meaning of the thing is that in many instances the two are identical. As was said in a previous context, it is all the same whether we say that the lighted match looks hot or that the match will burn the fingers or that the match means " will burn." To put it in another way, there is no difference between saying that the match looks hot and saying that we know it will burn the fingers. We call the present quality " hot " a meaning because we are able to behave appropriately with regard to it. If sense qualities are a device by which consequences are transformed into present traits or attributes, then the thing and its meaning are to this extent identical.

In other situations, however, the thing and its meaning fall apart. If we see the fire engine in the street with the firemen attaching the hose and a crowd gathering, we at once think of fire. The meaning of the perceived situation is " fire." Or if we notice that flowers and chairs and other things are being delivered at the neighbors' house we may say: " The Smiths are probably giving a party tonight." In cases of this kind the perceived object or situation may suggest some other object or event as a separate and distinct thing. The second object or event

is not observed in the same way that the first object is observed, either because the second object happens to be out of sight, as in the case of the fire, or because the second object is still in the future, as in the case of the party.

To repeat, the " meaning " of an experience may be present in the form of a sensory quality, as in the case of " hot," or it may be present in a wholly different way, as in the case of a fire that is not seen. In the latter case it is present merely as something suggested or possible; it is not " right there " before us as a perceived object. It is something that is indicated, suggested, or pointed to. In Dewey's phrase, it is " present as absent "; which has the sound of a paradox, but which is an accurate description of a psychological fact. This cleavage or contrast between what is directly present and what is " present as absent " presumably has its source in the fact that we are frequently uncertain in our responses. A faint smell, for example, may set up a variety of conflicting reactions in a watchful householder. The smell may tie up with the reactions for " fire," " escaping gas," or " decaying vegetables." The smell is clearly discernible; the " meaning " of the smell is in doubt. Consequently the situation tends to develop a contrast between the thing that is directly perceived and the " meaning " of this thing. The meaning is experienced differently; it is " present as absent." It is because other reactions crowd in and interfere that a contrast develops between the thing and its meaning. If there is no such obstruction, the contrast between the thing and its meaning disappears; we perceive the whole fact directly, as in the instance of the match, and the experience becomes a case of simple perception or recog-

nition. A familiar smell, like the smell of onions, for example, has no such internal division; there is just one simple present fact, which we call smell-of-onions.

On the basis of the foregoing description, then, we may conclude that the term meaning is used in two very different senses. In one sense the term applies to the change that has been made in experience as a result of previous observation or reflection. After a child has been scratched by the cat, there is a difference in the way the cat is seen. It is now an animal that is dangerous or to be handled with care. After we have lived in a new place for a while, the strangeness of the surroundings wears off and things begin to look different. We recognize the street corners and the shops; we know just where we are; the surrounding objects have new meanings. But they need not, at any given moment, have any meaning at all, in the sense of suggesting or pointing to something else. What we call their meaning is simply an immediate quality, by virtue of which they *can* be used as signs or indications pointing to other things, if there should be any need of using them in this fashion. We can hardly describe this quality except to say that the objects have for us a certain sense of familiarity. In the second sense of the term *meaning* we have to do with this quality of pointing to something else. When a thing is used as a sign of something else, the process is called inference and the thing pointed to is said to be the meaning of the thing that does the pointing. To use a thing as a sign tends to change it. As we get familiar with it, the relation of pointing drops out. We then still say that it has meaning, but this is because it has become a different sort of object, not because it actually points to something else.

"Definiteness, depth, and variety of meaning attach to the objects of an experience just in the degree in which they have been previously thought about, even when present in an experience in which they do not evoke inferential procedures at all. Such terms as 'meaning,' 'significance,' 'value' have a double sense. Sometimes they mean a function: the office of one thing representing another, or pointing to it as implied; the operation, in short, of serving as a sign. In the word 'symbol' this meaning is practically exhaustive. But the terms also sometimes mean an inherent quality, a quality intrinsically characterizing the thing experienced and making it worth while. . . . In the situation which follows upon reflection, meanings are intrinsic; they have no instrumental or subservient office, — because they have no office at all. They are as much qualities of the objects in the situation as are red and black, hard and soft, square and round." [1]

As was intimated a moment ago, it is probable that the relation of pointing enters into the picture because our reactions interfere with one another. As a result of this interference a contrast is set up between the thing immediately before us and the thing to which it points. A faint noise, for example, may suggest a railroad train, the rumbling of distant thunder, or the threat of an approaching tornado. Our response in such a case becomes uncertain because the behavior that would be appropriate to one of these suggested objects would not be appropriate to the others. If the noise is that of a distant railroad train, it can be ignored. If it is a sign of rain, it may be expedient to hurry home. If it is the noise of a tornado, perhaps some adequate shelter should be sought. But what kind of noise is it? What is heard is clearly a noise; there is no question about that. The thing that is in doubt is the *meaning* of the noise. Does it mean train or

[1] Dewey, J., *Essays in Experimental Logic,* pp. 16, 17. University of Chicago Press.

tornado or something else? These rival suggestions lack something of the quality possessed by the noise; if they did not, there would be no experience of uncertainty. Consequently they classify differently; they are at best only suggested objects.

In human beings this contrast between perceived objects and suggested objects leads to the discovery of a new relationship. It is the relationship of "indicating" or "pointing to." The noise is a real occurrence, and moreover it has the function of "pointing to" or "meaning" something else. To grasp this relation of pointing is to sharpen the contrast between perceived objects and suggested objects. As a result of introducing this relation of "pointing" between the perceived object and the suggested object, the suggested object becomes definitely classified. It acquires the status of being merely a suggested object.

This process of relating the present thing to the thing meant in such a way that the latter is recognized as a suggested object is tied up with the process of concept-formation. In order to form a concept the thing meant must not only be contrasted with the present thing so as to become a suggested object, but must further be detached from the present thing altogether so that it can be dealt with independently. When it is thus detached, the suggested object is transformed into a concept. We thus fashion for ourselves a new kind of object or thing, which goes by the name of concept.

In order to perform this operation it is necessary to attach the concept to some sort of symbol, which is usually a spoken or written name. These symbols ordinarily blend so completely with what is symbolized as to change

their quality. Words undergo a change in their sound or visual appearance as we come to understand their meaning. To have words in this changed form is to understand them, in the sense that we can behave appropriately with regard to them. With regard to this change in the quality or *feel* of words, James remarks,

> " Our own language would sound very different to us if we heard it without understanding, as we hear a foreign tongue. Rises and falls of voice, odd sibilants and other consonants, would fall on our ear in a way of which we can now form no notion. Frenchmen say that English sounds to them like the *gazouillement des oiseaux* — an impression which it certainly makes on no native ear. Many of us English would describe the sound of Russian in similar terms. All of us are conscious of the strong inflections of voice and explosives and gutturals of German speech in a way in which no German can be conscious of them." [2]

In brief, then, meanings arise as a distinctive feature of experience and blossom into concepts only as a result of certain complications within experience. When a noise is heard directly as " noise-of-train," there is no relation of pointing. Or if there is uncertainty, the noise may be heard alternately as " noise-of-train " and " noise-of-thunder "; the conflict of reactions does not wholly disappear, but it does not serve to create a sharp contrast between " thing " and " meaning." On the other hand, when the situation takes the form, " this means that," the contrast is clear and unmistakable. The relation of meaning then serves the twofold function of joining and separating the " thing present " and the " thing meant," and the latter becomes unambiguously a " suggested object." The process is completed by taking this object

[2] James, W., *Principles of Psychology*, Vol. II, p. 80.

out of the context in which it appears as a suggested object and ticketing it off with a label in the form of a name, which gives it the status of a concept.

It is a significant fact that the lower animals have never developed an "artificial" language. They often have what we call a "natural" language. Thus dogs bark and wag their tails, and the bark or the tail may be as expressive of the dog's attitude as spoken language would be. But dogs have never been known to invent anything that has even a remote resemblance to a telegraphic code. It is a simple matter for prisoners in a penitentiary to devise a set of symbols, or for a man arranging to meet a stranger in a crowded railway station to have it understood that he will wear a geranium in his lapel for purposes of identification. But this sort of thing is apparently beyond the reach of animal intelligence. It is possible only to an intelligence that can grasp the relationship involved in "A means B." When this insight is reached, B becomes a suggested object, as a thing that is meant or pointed to, whereas A is experienced as the thing that does the pointing.

In a sense, indeed, the lower animals also deal with suggested objects. A dog will scurry frantically to locate his master, whose voice he hears, but who is not in sight at the moment. Or the dog may race home to a hiding place when a thunderstorm approaches. Or again the dog may obviously be in a state of uncertainty in dealing with a strange object. In all these cases we recognize the presence of suggested objects to the dog, but the lack of a language indicates that these objects are not present in the form "A means B." If they were, it would be only a step to use some other thing, instead of A, to do the

pointing, since A in its capacity of pointing is merely a symbol. This is precisely what human beings can do. After this step has once been taken, we can go ahead and devise further symbols as we may see fit; that is to say we can construct an artificial language.

It is true, of course, that language " just grows," more or less like Topsy, and is rarely made to order. We inherit our language. It may happen, indeed, that a person deliberately invents a name in order to designate a new idea or a new discovery. But this is very rare. Moreover, the meaning of words is determined by use, and with gradual change in use they finally acquire meanings that no one intended at the start. All this may be granted without affecting the essential point of the present discussion, *viz.*, that the unique character of the relation of meaning must be apprehended in some degree if there is to be language in the human sense. Furthermore, symbols are necessary in order to deal with suggested objects independently, *i.e.*, in order to convert them into concepts which can be used for the kind of thinking that we call reasoning. The ability to grasp the relationship of meaning is probably the key to the intellectual supremacy of man over the lower animals.

The lack of concepts does not necessarily prevent the lower animals from behaving intelligently. Koehler's apes, for example, proved that they could grasp the relationships involved in placing a box in a certain position so as to reach the fruit that could not be obtained in any other way. This was clever, but it did not necessitate the use of concepts. The relations might be perceived without any process of abstraction, in much the same way that we " see " the speed of an approaching automobile and

realize the necessity of hurrying in order to get across the street ahead of it. The use of concepts, however, enables us to "figure out" things "in our heads," that is, without being dependent on physical objects. Let us suppose that a rainstorm is approaching while we are on an excursion and far from home. First comes the suggestion "rain," next the suggestion "dirt roads." These two concepts, taken together, give us an "implication," *viz.*, "mud." The concept "mud," together with the concept, "automobile," gives us the further result, "danger of skidding," which perhaps leads to the decision that it is expedient to start for home at once. This kind of process is what we call reasoning. It is abstract in the sense that it can let go of the immediate situation for the time being. The result of such reasoning, however, may be to transform the present situation extensively. It is now directly experienced as a situation that will have, besides "rain," also "mud" and "danger of skidding." The concepts are tools by which experienced situations are made over so as to take on new qualities.

Just how concepts function in the process of reasoning is not easily traced out in detail. For present purposes it is perhaps sufficient to point out that concepts, like all other objects of experience, are tied up with the reactions of the organism. Reasoning is a process in which various reactions are combined or reorganized, so as to reveal their implications. Thus if we are told, first that an object is round, and then that it is a cube, we get a conflict, which leads us to say that the two propositions are "contradictory." Or if we are told that an object is heavy and next that it is unsupported, we get the conclusion that is "must fall." The reactions connected with a given

concept represent our previous experience or knowledge of the matter designated; the "must" indicates that there is no other way in which the reactions can be fitted together so as to harmonize conflicts. The notion of necessity is thus born of reasoning. The operations of nature show sequences, but that is all. The element of necessity enters when we begin to concern ourselves with the "implications" of concepts.

It appears, then, that concepts are the product of previous inferences. That we take things as signs of other things is an observable fact. When these other things are subjected to the kind of process here described, they become concepts and can be used in all kinds of ways on subsequent occasions. They are a new kind of thing devised so as to serve a specific purpose, just as hammers and saws are made for specific purposes. As Dewey says:

> "If we but forget where they live and operate — within the event of controlled inference — we have on our hands all the mysteries of the double world of existence and essence, particular and universal, thing and idea, ordinary life and science. . . . When one considers the importance of the enterprise of knowledge, it is not surprising that appropriate tools have been devised for carrying it on, and that these tools have no prototypes in pre-existent materials. They are real objects, but they are just the real objects which they are and not some other objects." [3]

Perhaps it will occur to some readers that all this description is only an involved way of saying that concepts are different because they are "mental objects." Calling a concept a tool does not make it a thing that can be locked up in a box over night. And to say that concepts

[3] Dewey, J., *Essays in Experimental Logic*, pp. 434, 435. University of Chicago Press.

are to be looked for only "within the event of controlled inference" seems like saying that they are mental, so that we are really back to where we were, *viz.*, to the doctrine of mental states. What is the difference?

As a matter of mere naming, it makes no particular difference, of course, whether concepts, and likewise images and memories, are called mental things or not. "A rose by any other name would smell as sweet." Naming makes a difference only when the name carries with it an antecedent judgment as to the nature of the thing that is named. There is no harm in calling a rose a potato, provided that we do not expect the rose to have the qualities of a potato by virtue of the name we have given to it. In the case of the term "mental" it is almost impossible to avoid doing this sort of thing. After centuries of dualistic thinking the term "mental" has become so loaded with a particular meaning that it is pretty sure to reintroduce all the divisions and oppositions which present-day thinking is trying to overcome.

Let us take again the situation in which the gathering clouds suggest rain. The rain in this case is a suggested thing. We may call this mental, if we like, provided that we treat "suggested thing" and "mental" as synonymous. If so, then "mental" means simply that the thing in question is the kind of thing which we call a suggested thing. There is at the moment no actual rain, or we are uncertain whether there is actual rain in the distance. Whether we use the label "mental" to indicate this state of affairs, or employ some other term, is in itself a matter of indifference. But if the use of this term brings in a whole philosophy of reality, it makes a very great difference. That is, if we take for granted that the clouds are

"out there" as a physical fact, whereas the rain is just a notion presumably "in our heads," then we have a problem which defies all our intellectual ingenuity, as the history of dualism bears witness. Physical things and mental things then fall apart, and there is no way of bringing them together again. By contrast, perceived objects and suggested objects do not thus fall apart. They are continuous with one another in the same experiential situation. Moreover, if we keep them thus together, our whole procedure in explaining what we call experience becomes different. We do not take our perceptions as copies of other things; they *are* the things of our environment. The whole problem of knowledge and of learning becomes a problem of relations within experience. To put it differently, the surrender of dualism means that we are concerned only with distinctions within experience, and not with a hypothetical opposition between experience and a reality beyond all experience. This change in point of view changes our whole outlook on experience and on the nature of intelligence.

To quote again from Dewey, "That suggestion occurs is doubtless a mystery, but so is it a mystery that hydrogen and oxygen make water. It is one of the hard, brute facts that we have to take account of."[4] On the other hand, when we interpret this occurrence in terms of dualism, we are not dealing with "hard, brute facts" but with a very dubious philosophic theory. These suggestions may be true or false; we may be mistaken when the clouds suggest the approach of rain. Or it may be that the suggestions which occur are, from the point of view of truth

[4] Dewey, J., *Essays in Experimental Logic,* p. 49. University of Chicago Press.

and falsity, merely idle suggestions. The clouds may suggest snowbanks and may evoke pictures of Arctic explorers floundering around and freezing to death. Or again they may call up memories of childhood scenes. How all this comes about and what functions are performed by images and memories in the transformation of present experience is an important chapter in psychology. Our present concern is not with the details of such explanation, but with the contention that the continuity of experience must be conserved and that all explanation has to do with the processes by which the present experience is made over into something else.

From the standpoint of education the nature and function of meanings are of peculiar importance, because meanings are the tools of thinking. There is a sense in which we can say that the whole of education centers on the development of concepts. If a person leaves school with adequate conceptions of government, force, energy, heredity, patriotism, and the like, he is an educated person. A proper development provides both the tools for later thinking and exercise in their use.

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CHAPTER XVI

EDUCATION FROM A PRAGMATIC POINT OF VIEW

Our whole discussion, up to the present point, is only an elaboration of the thesis that theories of learning are embodiments or applications of conceptions regarding the nature of mind. The history of education bears testimony to the fact that influential theories of the mind translate themselves at some point into educational practice. If we assume that the mind exists antecedently waiting to be trained, the natural result of this assumption is formal discipline. Or if we take for granted that the mind consists of a collection of impressions or mental states, we may then easily exalt the rôle of the teacher and formalize the process of instruction. In the one case the mind is, indeed, a source of energy or power, but the primary use of subject matter is to serve as gymnastic material. In the other case the emphasis falls primarily on the acquisition and organization of material, but with little regard for the development of individual capacity and interest. In both cases the conception of mind that is basic to the corresponding educational practice tends to set the mind apart as something to be trained or moulded. The selection and organization of subject matter is not determined by a purpose or aim that the learner is seeking to realize, but is imposed from without; with the result that education becomes formalized.

If we abandon this ancient dualism, we limit the native equipment of the individual to a certain set or group of

inborn tendencies or impulses, as determined by the structure of the nervous system. This point of view is held in common by behaviorism and pragmatism. In the application or elaboration of this point of view, however, they soon part company. For behaviorism — and likewise for Thorndike — the process of learning consists in coupling fixed stimuli with fixed responses. On the side of response, we sort out certain reactions and get rid of the rest. On the side of stimulus we sort out a certain part or aspect of the total situation, to the exclusion of what is left. Learning is a process of selecting both the stimulus and the response. It is a process of substituting the part for the whole. In the language of Thorndike, all learning is analysis.

It is unnecessary to rehearse all the objections previously raised against behaviorism. We may remind ourselves, however, that, with respect to formalism, behaviorism represents no advance. Behaviorism, like dualism, takes its clue, not from the idea that significant learning requires a situation which evokes a purpose and offers raw material for the realization of that purpose, but from some preconceived end, to which the pupil is to be made to conform. According to behaviorism practically any stimulus can be tied to any response. The teacher, therefore, selects beforehand the pattern according to which he is to mould the pupil and then goes to work. Thus Watson's suggestions regarding the cultivation of emotional responses, and Thorndike's doctrine of the formation of S-R bonds, clearly presuppose that both the process and the result are to be determined entirely by the teacher.

Whether we make intelligence a *deus ex machina,* an agency that functions from the outside, as is done by

dualism, or, on the other hand, reduce intelligence to terms of physics and chemistry, as is done by behaviorism, seems to be educationally unimportant. In neither case can intelligence be made to function effectively in learning situations. The difference is unimportant because neither position gives practical recognition to intelligence or mind as the function of recreating or reinterpreting a situation so as to give it a new meaning. In other words, educational theory can hardly provide an escape from the ideal of conformity to the existing order, unless intelligence is regarded as a certain unique type of interaction between a living organism and the things of its environment. If we treat intelligence as a separate thing or deny its existence, we are pretty sure to neglect the significant traits of this distinctive type of interaction, and this neglect means that we are educationally on the wrong track.

"The net conclusion is that acting with an aim is all one with acting intelligently. To foresee a terminus of an act is to have a basis upon which to observe, to select, and to order objects and our own capacities. To do these things means to have a mind — for mind is precisely intentional purposeful activity controlled by perception of facts and their relationships to one another. To have a mind to do a thing is to foresee a future possibility; it is to have a plan for its accomplishment; it is to note the means which make the plan capable of execution and the obstructions in the way, — or, if it is really a *mind* to do the thing and not a vague aspiration — it is to have a plan which takes account of resources and difficulties. Mind is capacity to refer present conditions to future results, and future consequences to present conditions. And these traits are just what is meant by having an aim or a purpose. A man is stupid or blind or unintelligent — lacking in mind — just in the degree in which in any activity he does not know what he is about, namely, the probable consequences of his acts. A man is imperfectly intelligent when he contents himself with looser guesses

about the outcome than is needful, just taking a chance with his luck, or when he forms plans apart from study of the actual conditions, including his own capacities. Such relative absence of mind means to make our feelings the measure of what is to happen. To be intelligent we must 'stop, look, listen' in making the plan of an activity."[1]

By insisting on the importance of purposiveness or foresight, Dewey does not underestimate the part that habit plays in human behavior, but points to a different conception of the meaning of habit. It is doubtless true that the reaction of a normal adult to any given situation is largely the outcome of the habits or disposition that have been acquired in previous experience. A physician examining a patient, or a mechanic examining a defective apparatus, uses his stock of habits to interpret what he sees. It is owing to these habits that things have meanings or values to an expert which they do not have to a layman, or to an adult as compared with a child. All this must be conceded, and even insisted upon. The issue, with regard to behaviorism, turns on the manner in which habits are supposed to function in giving direction to behavior.

If we start with the conception that the living organism is a source of energy or activity which is seeking expression, the habits already established in the nervous system become channels or media for the release of this activity. Thus a man with free time on his hands may consider retiring to a cozy corner with a good novel, hiring an automobile for a ride, going to a baseball game, or practicing on the violin. These suggestions are obviously the

[1] Dewey, J., *Democracy and Education,* p. 120. The Macmillan Company.

result of modifications previously made in the nervous system. They could not occur to a savage, or to a Puritan of the seventeenth century. Our habits obviously serve a twofold function. They provide opportunities for the expression of activity, and at the same time they determine the limits within which this expression must take place.

The next point to notice is that the suggestions which occur come in as elements in a larger situation. They cannot be acted on forthwith, but require a certain adaptation before they can be carried out. Playing the violin will disturb the household, hiring an automobile will be expensive, and so on. Some adjustment is called for. "Where there is a will there is a way." Even if no difficulties block the way, there is still need of an adjustment that is not mechanical in character. The money for the trip must be drawn from the bank, the violin must be brought from the place where it was left the last time. Even crossing the room and picking up a newspaper requires certain non-mechanical adjustments, such as walking so as to avoid articles of furniture and reaching to pick up the paper. Acts of this sort are guided by the perceived situation, which directs them towards an end. Habits enter into such activities and make them possible, but the habits are combined into wholes which as wholes are not mechanical at all, but flexible, so as to suit the circumstances of the moment. The final act is an integration of habits and is a new thing.

On higher levels we call this process of organizing habits into a new pattern by such names as inventiveness or creativeness. The inventor, the architect, the statesman, and the scientist, for example, use their habits in

solving problems, but the solution of the problem is something new. Similarly old habits come into play when we carry on a conversation or play a game of golf. Pronunciation, sentence structure, modulation of voice, all reflect old habits, yet the combination of words may be new, just as in golf the particular stroke may be somewhat different from any that we have tried before. This flexibility, or control by a purpose or aim, is the essential and differentiating trait of conscious behavior. So far, behaviorism has failed completely to give an adequate or even reasonably plausible account of this trait. In order to understand conscious activity it is necessary to deal with habits, not in isolation, but as elements in adaptive behavior.

The bearing of this conclusion on habit formation is significant. It indicates that sheer repetition is not as important in shaping habits as we have been led to suppose.[2] Take, for example, the habit of giving way to anger. A habit of this kind may be steadily fostered, even though the expression of it varies all the while. Indulgence in such a tendency may mean that a man kicks the dog that comes in his way, slaps the child that disturbs him, growls at his wife, is crusty towards his neighbor, and sulks in the presence of his boss at the office. The expression of the tendency necessarily varies, since behavior that has to be endured in the home would not be tolerated at the office. But the disposition finds some kind of outlet nevertheless, and it grows as a result of being nourished. Other tendencies, which are likewise present at the beginning, such as friendliness or sociability,

[2] *Cf.* Dunlap, K., *A Revision of the Fundamental Law of Habit Formation, Science,* April 6, 1928, p. 360.

sympathy, sense of humor, and the like, are starved through neglect and gradually lose the power to control the disposition towards anger. In the end, as Dewey says, the cultivation of this disposition may eventually result in murder, which could then fairly be said to be the expression of a habit, even though such a result had never occurred before. The moral is, of course, that habits may be fostered even though repetition is at a minimum.[3]

Translated into terms of school practice, this view of habit implies that what is of primary importance is the development of habits as attitudes, with the acquisition of skills as incidental thereunto. To achieve results in spelling or arithmetic, for example, it is more important to secure a standard of accuracy than to rely chiefly on drill. If the standard or disposition has once been achieved, the drill comes in naturally and effectively as a means to an end. The same may be said with regard to the development of any trait. There is a temptation to assume that the heart of the educational process consists, first, in determining by some kind of analysis what particular facts are most important in history, geography, etc., or what particular processes or activities are of frequent application in mathematics, or in the acquisition of such traits as accuracy, neatness, courtesy, and the like; and, secondly, in concentrating on skill or effectiveness in handling this material. In other words, there is danger of neglecting the larger meaning of habit. The analysis may, indeed, supply much valuable material. In the case of spelling, for example, it is better, as a general thing, to work with words that are in common use than

[3] *Cf.* Dewey, J., *Human Nature and Conduct,* p. 42. Henry Holt & Company.

with words that are of interest chiefly as curiosities. But in any case the material should be used primarily as a means of fostering desirable dispositions.

This line of considerations leads us once more to the importance of interest in education. Without interest it is futile to expect significant results in the development of dispositions. Or, to state the same thing in different language, there must be an aim or purpose that is "internal" to the learning process instead of being imposed from without. This view, it may be mentioned in passing, has a special significance for character education. Training in specific acts of honesty, truthfulness, etc., is not necessarily any more moral than training in the use of the typewriter. But we can go a step further. Even if we secure an interest in honesty and truthfulness, that is, a disposition to act in accordance with certain standards, it does not follow automatically that we are achieving desirable moral ends. Truthfulness, as the term is usually understood, may on occasion be unintelligent and dangerous; and virtues such as honesty, loyalty, and perseverance need some kind of standard for their proper application. Unless they are based on some more fundamental disposition or interest, such as interest in the common good, our moral education may tend to mechanize conduct and to create obstacles to progress.

In discussions of moral education we often seem to take for granted that the chief problem is to develop certain traits, in the sense of securing *more* truthfulness, *more* tolerance, *more* sympathy, etc. This is a quantitative point of view, which breaks down under criticism. Truth-telling may be ruthless and brutal; tolerance may encourage crime; and sympathy, on the part of juries, may make

it impossible to secure convictions. The problem in moral education is not to secure a quantitative increase in traits, but a re-direction of them. The traits must be coördinated and directed towards a worthy end, which means that moral education requires a social ideal and the continuous exercise of intelligence in the interpretation and application of this ideal. Habit is merely the tool of intelligence.

This interpretation of habit gives a new significance to the function of intelligence. The insistence that habits must be kept flexible so as to meet the exigencies of changing circumstances means that education must aim to make behavior intelligent by providing resources for dealing with novel situations. As contrasted with the rigidity of mechanical habits, it means freedom, which, according to Dewey, means essentially the operation of thinking in the form of "intellectual initiative, independence in observation, judicious invention, foresight of consequences, and ingenuity of adaptation to them."[4] In a word, the concern of education is not with the strengthening of mental faculties, nor with the acquisition and organization of information, nor yet with the formation of S-R bonds, but with the cultivation of thinking. For the power to think is the educational kingdom of heaven; if we seek it persistently, other things will be added unto us. Thinking means flexibility of habit; it means a dominating purpose which achieves its realization by a reconstruction or reorganization of previous experience.

If intelligence has to do with this flexibility of habits, it is evident that we must be careful in the interpretation of the results of mental tests. To say, for example, that

[4] Dewey, J., *Democracy and Education*, p. 352. The Macmillan Company.

a man's mind means "the size of the tank into which sensations, perceptions, all that makes up the sum of knowledge, are poured throughout his life, by his education and his experience,"[5] is altogether too easy. The mind is not a tank, and this talk about its "size" is risky business. It is equally risky to take for granted that the mind is a special organ, analogous to the organs of the body. But if we rule out assumptions of this sort, we are no longer in a position to make confident assertions regarding the limits of what education can or cannot do by way of improving intelligence.[6]

This conception of habit likewise has an important bearing on the question of transfer of training. What makes habits flexible is the integration of different activities with one another so as to form larger units, which are modified or adjusted in dealing with specific situations. The readjustment is made necessary by the fact that some new element or factor gets into the situation. This complex of reactions expresses itself in meanings; hence it is possible to say that we meet the new situation with an old meaning, and that transfer takes place through meanings. This interpretation is important because the readjustment of activities that takes place, is found to be, on the side of meanings, a process that involves both analysis and synthesis. The recognition of the old meaning in a new situation is a form of analysis. But in order to make this analysis possible, it is necessary, at the same time, to relate this meaning to the new factors or circumstances, which is synthesis. Sometimes this synthesis can be achieved only

[5] Trabue, M. R., and Stockbridge, F. P., *Measure Your Mind,* p. 27. Doubleday, Doran and Company.

[6] For a brilliant criticism of unwarranted assumptions in this field see Bagley, W. C., *Determinism in Education.* Warwick and York.

by making an important change in the original meaning, as, for example, in the discovery that the moon is a falling body.

The proposition that "all learning is analysis" is inspired by the attempt to account for learning without any such process of reconstruction or reorganization. "To provide the proper conditions for abstracting a character," according to a recent writer, "it is necessary to present a large number of different situations which contain the element. When the abstract quality is given in but one situation, or but few situations, the dissociation is seldom complete; the element remains embedded in the larger unit." [7]

The passage just quoted clearly implies that the process of forming an abstract idea is only a process of dissociation. A child who looks at a square box is supposed to perceive squareness along with the other qualities of the box; the chief difference between the child and the adult, on this view, is that for the child the squareness is not separated from the rest but "remains embedded in the larger unit." From this point of view the concept of squareness is formed by an essentially mechanical process: all that is needed is to draw a line around the quality of squareness, like quarantining a patient who is coming down with the smallpox. By presenting the quality of "square" in a variety of contexts — boxes, tables, pieces of paper, ink-wells, — the association of squareness with other qualities is weakened until squareness finally drops out of these contexts altogether, as a ripe apple drops from the tree.

[7] Gates, A. J., *Psychology for Students of Education,* p. 307. The Macmillan Company.

This theory has an engaging simplicity, until it is examined more in detail. As long as the quality of squareness is not abstracted, so we learn, "it is not known as such but only rather vaguely as a feature of the box situation."[8] This statement, if we assume that it is true, is not easy to interpret from the point of view of the theory under consideration. If squareness is at first known "rather vaguely" because the reaction to squareness is all mixed up with the reactions to other qualities, we may assume that these reactions modify one another. This assumption is the same as saying that there is no reaction present which can properly be called "reaction to squareness." What is called "reaction to squareness," after the concept of squareness has been achieved, is something different from the original reaction. This final reaction is not merely sorted out, but is something new, something built up in the course of what we call concept-formation. No ground whatever exists for the notion that the reactions which occur simultaneously do not modify one another. If the different reactions were so carefully insulated as the theory seems to assume, it is hard to see why there should be anything vague about our perception of squareness or how it happens that we see the square box as a single object. How can the different qualities be "embedded in the larger unit" unless the corresponding reactions are similarly embedded in a larger total response?

The idea that the child experiences squareness from the beginning, but that he experiences it "rather vaguely," is an instance of what James calls "the psychologist's fallacy," *viz.*, the fallacy of reading back into the experi-

[8] *Ibid.*, p. 307.

ence of the child what is present in the experience of the adult. Because we see colors and shapes, etc., therefore the child, too, experiences them, albeit "rather vaguely." It is much more accurate and less misleading to say that the child does not experience them at all, but experiences something different, for which James's "buzzing confusion" is as good a label as anything else. When we attribute to the child the reactions of the adult, we are committing precisely the same error on the side of physiology. There is no more reason for attributing to the child a "reaction to squareness," merely because the original reaction is ultimately made over into a reaction to squareness, than there is for supposing that the egg contains a miniature chick, since a chick is eventually hatched from it.

What is called analysis and abstraction, then, is at the same time a process of synthesis or construction. In order to form the concept of squareness, it is necessary to add something which was not there before. This "more" which is added comes from the discovery that the corners of a square are all alike, that the sides are of equal length, that the center is the intersection of two lines joining opposite angles, etc. Our concept of squareness may be rich or it may be meagre in content, but in any case it represents a process of building up, and not simply a stripping off of associated qualities, so as to isolate the quality of squareness from everything else. This process of development is bound up with the function of suggestion. Thus the suggestion occurs at some point that the sides or the angles of a square are equal, and this suggestion then finds verification in some kind of test or inspection. The present experience of the square object is

made over or enriched through the use of suggestions, and at the same time these suggestions are incorporated in the concept, so as to give it more content and make it more available for use in other situations.

This conclusion has a direct bearing on educational practice. As was said just now, concepts are formed by using suggestions as tools for the reorganization or reconstruction of experience. This reconstruction must be done by the pupil himself, but an understanding of the nature of the concept affords certain clues for the guidance of the teacher. In particular it disabuses the teacher of the notion that the things to be learned by the pupil are already present to him, as in the example of squareness, and that the rest is for the pupil to accomplish. New material must be introduced (as, *e.g.*, the equality of sides and angles in a square), and the pupil must be encouraged and guided in using the concept as a basis of inference (as, *e.g.*, that a square has a shorter perimeter than any other rectangular figure of the same area).

For further illustrations of the reorganization or synthesis which takes place in forming a concept like squareness, we can point to the history of discoveries and inventions. In every case old facts are seen in a new light, that is, new relations are introduced. To cite a specific case, it was discovered long ago that objects submerged in water are subjected to pressure, which increases in a certain proportion to depth, and this phenomenon was formulated in the law of fluids. It is nonsense to say that this discovery was only a matter of analysis. The law was not merely found, as a dead fish might be found in the water. What was found was certain pressures, and nothing more. These pressures had to be related to depth,

so as to lead to the further suggestion that pressure varies with depth. In other words there was introduced as a new element the idea of a scale or series of pressures. What was needed in order to make the discovery was the ability to " catch on " to the relation between depth and pressure. This brings in the relation of proportion or concomitance, which then becomes matter for testing. This process of discovering and testing meanings, which is what constitutes thinking, exemplifies Dewey's requirement of " intellectual initiative, independence in observation, judicious invention, foresight of consequences, and ingenuity in adaptation of them."

The illustration may be carried a step further. In the course of time the suggestion presented itself that the atmosphere is likewise a fluid and subject to the law of fluids. This idea was derived, of course, from a perceived resemblance between water and air. For practical purposes it may be sufficient to say that this resemblance was analyzed out of the total set of phenomena which we call air, or that it was only a case of abstracting an identical element. A statement of this kind, however, does not do justice to the psychological facts. In order to see the old, familiar fact — fluidity and pressure — in the new context or setting, it was necessary to reinterpret facts further so as to complete the picture. Fluidity becomes dissociated from moisture, winds become ocean currents, mountains become elevations in the ocean bed thrusting their heads towards the surface, the fluid called air differs from the fluid called water in that it has a high degree of compressibility, etc. What actually happens is a reconstruction of the known facts pertaining to the atmosphere on the basis of the new suggestion.

To some extent, and in some cases to a considerable extent, this reconstruction or reinterpreting of facts takes place after the new idea has been discovered. This process of reinterpretation goes on in connection with the testing of the idea. If air is a fluid, then a barometer will fall as it is carried up the side of a mountain, a vessel containing air will reveal pressure outward if placed in a vacuum, etc. The facts to be interpreted are gathered by observation and prediction, and in proportion as they are interpreted they become evidence for the reliability of the idea. All this is obviously a process of synthesis. The point to be especially noted in this connection, however, is that this process of synthesis takes place not only after the idea has been discovered, but in the process of discovery itself.

This synthesis was pointed out a moment ago when it was stated that the discovery of the law of fluids required the ability to combine or relate the observed facts by putting them together so as to get a system of fact in which pressure varies with depth. If we undertake to reduce this process of discovery to sheer analysis, we miss the element of creativeness or construction that is distinctive of intelligent behavior. The process unquestionably involves analysis, but it clearly involves synthesis as well. In a purely mechanical process analysis and synthesis are incompatible, but in the operations of intelligence they are complementary aspects of one and the same activity.

The extension of the law of fluids so as to include atmospheric phenomena is another illustration of the same thing. Merely to grasp the idea that the law of fluids applies to the air is to group or relate the facts in the case so as to exemplify the law. In this process of syn-

thesis a great deal of new material may be introduced. A geometrician, for example, can study squares and circles until he has discovered a wealth of meaning that is unknown to the average man. The moral of all this is, first, that the concepts used by pupils may be much poorer in content than is suspected by the teacher, and, secondly, that the process of securing or enriching concepts, being a process of synthesis as well as of analysis, requires the teacher to consider carefully beforehand the elements or constituents that should be included in the concept. When it is once clearly perceived that the pupil must perform this process of building concepts for himself, the whole educational venture takes on a specific direction. It at once becomes necessary to leave the pupil sufficient room for initiative and experimentation, it requires problems to be meaningful and not just school tasks to be got through with somehow, it provides for sustained endeavor, without which interest degenerates into caprice and a quest for amusement, and it imposes on the teacher the obligation to vary or adapt his methods so as to make them instruments for the promotion of thinking.

Perhaps the foregoing discussion will seem to place a one-sided emphasis on purely intellectual development, to the neglect of artistic or emotional development. It must be remembered, however, that thinking is not a separate faculty, but a mode of procedure in achieving aims. The aim or purpose may be scientific discovery or it may be writing a poem, painting a picture, or organizing a debating society. No matter what the undertaking, if it is engaged in wholeheartedly, it involves appreciation. All that education can do is to cultivate or refine appre-

ciations by reorganizing the situations in which they arise. Our appreciation of a discovery is heightened as we find new applications for it, just as our appreciation of a literary masterpiece or a musical composition is heightened with the discovery of new meanings. It may be true, as Watson maintains, that likes and dislikes can be attached to particular things by forming new conditioned reflexes. Why intelligence should be kept out of the picture, however, is past finding out, unless the purpose is to reduce everything to the formulae of mechanics. It is hardly open to question that appreciations or emotional reactions can be shaped by the process of reorganizing or reconstituting the experienced environment, which is the differentiating trait of conscious behavior throughout all its forms. The purpose of education is to make this process as effective as possible, and so we emerge with the conclusion that, as regards method, the cultivation of thinking is the central concern of education.[9]

The significance of this approach to education is that it makes the pupil the real point of departure. In proportion as we endeavor to make education a release of capacity or a stimulus to thinking, we break away from the old oppositions of vocation and culture, work and play, duty and interest, etc. These distinctions become distinctions of emphasis, instead of hard and fast oppositions. Consequently we are compelled to reformulate our educational philosophy and to reorganize our curricula. If our ideal is not conformity to the existing social order, what should be the relation of an educated person to his social environment? In other words, what would con-

[9] Dewey, J., *Democracy and Education,* p. 179. The Macmillan Company.

stitute an ideal social order? What must the curriculum be like in order to give proper scope to individual initiative and at the same time provide for continuous development in the direction of a desirable social outlook? [10]

The application of this point of view to classroom situations likewise requires extensive readjustments. The emphasis on creativeness in learning is a movement away from the idea of conformity, and so requires a different social atmosphere and social ideal in the school. The concept of individual differences acquires a new significance when viewed from the present point of view. We are far from having exhausted this significance when we have arranged to group pupils according to grade of ability or to let each pupil progress at his own rate. What gives significance to present-day educational experiments is especially the attempts that are made to capitalize special interests and capacities and to organize the work so as to encourage the individual pupil to make his own particular contribution to group undertakings. In order to do this successfully, the teacher must have as equipment, not only the quality of sympathy and discernment to understand individual pupils and the ability to understand the ends that are to be attained, but also the further quality of resourcefulness, which will enable him to keep his methods or procedures flexible so as to suit the needs of the occasion.

"Successful teaching requires that the teacher have in mind a generalized procedure, a teaching technique, which determines the major emphasis of his work; but it is equally important that these procedures do not become formalized. The essentials in teaching

[10] The bearing on social ideals and on curriculum construction of the educational ideal of a "free intelligence" is discussed in the succeeding chapter.

are to plan consciously for learning situations which motivate a pupil's work through an understanding and appreciation on his part of the significance of what he is to undertake, which promote thoroughness and persistence and responsibility in study by means of both the stimulus of group contacts and intelligently planned opportunities to progress according to individual needs; and a formulation of what has been learned in such a manner that it leads to further growth.

"Such a teaching procedure will at times be free and informal. At other times it will be carefully controlled and regulated. It will never be stereotyped. And, in so far as we adopt it, our conception of the teacher as primarily a hearer of lessons will give way to a conception more analogous to that of a scout master who leads his group into a country familiar to himself but filled with adventure and wonderful opportunities for the moral and intellectual development of his followers." [11]

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[11] Thayer, V. T., *The Passing of the Recitation,* pp. 326, 327. D. C. Heath and Company.

CHAPTER XVII

OUR CHANGING OUTLOOK

It is a commonplace that society provides for its own continuity by means of its schools. If the achievements of the past were not handed on by means of the agencies of formal education, society could not maintain its present level. But in addition to conserving the past, the schools are expected to contribute to progress. The possibilities of the schools for this purpose are so well recognized that reformers are always keen to use them as means of propaganda for the interest that they happen to have at heart. Consequently, there is always pressure for the revision of the educational program. Moreover, the function of conserving the past in itself requires constant revision, because the past is a growing thing. We now have a different past to conserve. Consequently, the education that suited the needs of an earlier generation does not necessarily suit the needs of the present. We have outgrown the classical curriculum, just as we are outgrowing the traditional opposition between vocational and liberal education.

The changes that are brought about in education as a result of social development are likely to represent both a change in content and a change in attitude or outlook. Thus the modifications of the classical curriculum not only introduced additional subject matter, but expressed a different conception of the relation of the individual to

the social order. Negatively it meant that the caste system symbolized by classical education was breaking down; positively it meant that the idea of a social order characterized by flexibility and regard for individual opportunity was gaining wider recognition. To a large extent this change in attitude was first generated outside the schools and then forced its way into the educational program. An understanding of this change is indispensable if the schools are to make their proper contribution to social progress.

The chief factor in producing the attitude or temper of mind that is characteristic of the twentieth century is undoubtedly to be found in modern science. As compared with previous periods of history, the present is preeminently an age of science, and science is, in very truth, making over our whole civilization. The changes wrought by science relate, first of all, to the material conditions of living and to social institutions and practices; and these changes, in turn, have helped to modify our outlook on life or our attitude towards the world.

With regard to the changes in material conditions, some of them are so patent that he who runs may read. Transportation and communication have been revolutionized in the course of the past hundred years. We have a new industrial order. It has been stated that twenty-five per cent of the workers of this country are engaged in occupations that were wholly unknown thirty years ago. The average person, including the very young person, has achieved a degree of economic independence such as the world has never seen before. The mobility of our population is reminiscent of pioneer days, but its range of travel has enormously increased until the old isolation

has all but disappeared. The traveler does not vanish into a trackless wilderness, but finds himself everywhere in a civilization that is all center, without margin or circumference. If the President in the White House has an attack of indigestion at noon, or if a pitcher in a major baseball league pitches a no-hit game in the afternoon, every patriotic heart in the country thrills to the news over the evening newspaper. The radio and movie have also done their share to make distances shrink to the vanishing point. We need but glance at these conditions to realize that the education of yesterday is no longer suited to the youth of today.

The changes that have taken place in the external conditions of life are modifying the institutions and practices of our social structure in all sorts of ways. There is considerable evidence that the atmosphere of home life is different from what it used to be. Father is no longer an unquestioned fount of wisdom and authority, as of old. He can learn much from his children, and he must constantly take care if he is to maintain his prestige. Parents are expected to be courteous and pleasant at home if they wish their children to stay with them. We hear the explanation that matrimony need not mean the abandonment of independent careers for women, and off on the horizon we hear sinister rumblings of companionate marriages. Labor is taking lessons from capitalism in the art of organization and business management. Both theology and politics are undergoing a significant change of emphasis. The old shibboleths and slogans are losing their potency. Only yesterday the distinction between a Presbyterian and a Methodist, or between a Republican and a Democrat, seemed vitally

significant; now it takes a set of blueprints to tell the difference.

These changes are important as signs of other changes. On the one hand they point to a deeper meaning of what we call democracy. To provide opportunity for all the members of the social order requires, as we now more adequately perceive, group responsibility for education, for the regulation of economic competition, for health, for recreation, and for a host of other things. On the other hand, these changes indicate a modification in what was designated a moment ago as attitude or outlook. We are becoming absorbed in the opportunities created by science, and through this absorption are inevitably making a change in attitude. The lack of science in former times meant lack of control over the material environment, and this lack of control dictated a specific attitude toward life. The material environment was too stubborn and unyielding to offer much promise of supplying the things that men set their hearts upon. For the most part the struggle with the environment was merely a struggle for the necessities of existence. Man's longings for the true, the good, and the beautiful either had to remain unsatisfied or had to be satisfied elsewhere. It was no accident, therefore, that a sharp dualism was developed. On the one hand was the life of everyday affairs; on the other was the life of man's higher aspirations. For the satisfaction of these higher aspirations man turned either to the life beyond the grave or to a purely ideal world of his own creation — a world of art and literature and philosophy — the world of what we now commonly call the classical tradition.

Just how did this result come about? In its first in-

ception the classical tradition did not mean withdrawal from the world, but a return to the world. It dates back to the period of the Renaissance, when the scholars of Europe began to foster the study of classical learning as an escape from the narrowness and intolerance of ecclesiasticism. They sought for a wider range of interests, for more humaneness and tolerance of spirit, and so they turned back, of necessity, to the ancient world. In the great writers of the past they found a wealth of intellectual, ethical, and esthetic interests and a spirit of inquiry that was untrammeled by the domination of priestcraft. Under the influence of these ancient writers they constructed an ideal of the good life which was largely Greek and which set the pattern in education for several centuries. It cultivated a sense for the true, the good, and the beautiful; but it suffered from a defect which became progressively more apparent and which finally proved fatal. This defect consisted in the fact that its ideal was static. At the outset there was a certain measure of justification for disregarding the present and identifying liberal education with the study of a certain selected body of subject matter drawn from the old masters. With the development of modern civilization, however, this justification grew less and less. As the needs of everyday living became more numerous and more insistent, there grew up a corresponding demand for a type of education that would recognize the possibility of achieving cultural ends in and through practical affairs. This demand was largely ignored or slurred over. Consequently the classical tradition found itself increasingly out of touch with the times and in the end it became — to put it sweepingly — a gospel of defeat. Practical life, as Bertrand Russell

has told us in his essay on "The Free Man's Worship,"[1] is hopelessly crude and ugly and brutal; wisdom dictates that we give it up as a bad job. The things of the spirit dwell in a realm apart, in the world of literature, art, and philosophy created by man's imagination. We cannot escape altogether from the demands of practical life, but we can provide ourselves with a retreat where things are more nearly in accordance with the heart's desire.

This dualism of culture and vocation is rapidly being undermined at the present time. The farmer of today is an excellent illustration of what is going on. Only a few decades ago he led a lonely existence, filled mainly with arduous, routine work. For the boy with a taste for intellectual things all roads led away from the farm. Now, however, farm life is becoming a fairly adequate medium for the expression of a wide variety of interests and capacities. The automobile, the radio, and the daily newspaper bring the outside world to every door, and labor-saving devices provide a margin of energy and leisure. The farmer is beginning to give up his traditional individualism and to engage in various coöperative enterprises. Up-to-date agriculture requires an extensive background of science, together with skill in the handling of fairly complicated machinery. Rural homes are becoming more convenient and more attractive. In brief, all kinds of intellectual, social, and esthetic opportunities are now becoming available, which is to say that the farmer's aspirations for the true, the good, and the beautiful now permit extensive translation into terms of his everyday activities.

Perhaps the farmer presents an exceptionally favorable

[1] Russell, B., *Philosophical Essays.*

illustration. In some of its aspects, indeed, the transformation of vocation was a change for the worse. Quantity production and division of labor sometimes create conditions that are sadly out of keeping with the spirit of democracy. Nevertheless, the changes that have been brought about by the applications of science have revealed the possibilities inherent in vocation for the expression of those traits or qualities of human nature which formerly were supposed to be dependent for their development on a detached culture. Speaking generally, vocation makes new demands on intelligence, is more intimately and more broadly conscious of its social relationships, and provides more outlet for the esthetic life. As a consequence the dividing line between vocation and culture is becoming increasingly arbitrary and artificial.

The disposition to locate the supreme values of life in the beautiful isle of somewhere, which by some was identified with the classical tradition and by others with the heaven of popular religion, was symbolic of a dualism that pervaded the whole of life. This dualism was expressed in the opposition between culture and vocation, between the here and the hereafter, between faith and reason, between intelligence and morals, and, in due time, between science and the humanities. All these dualisms have as their philosophical counterpart the dualism between mind and body. In education this dualism was made the basis for training separate faculties, such as reason, will, conscience, and imagination; it led to contempt for the body, to the conception of morality and duty as innate and absolute, and to the notion that sense-experience means the passive reception and registration of the stimulations coming from the environment. It thus

provided a philosophical justification for a disposition that is becoming more and more at variance with the temper of the modern mind. Our present attitude towards the environment, physical and social, is not one of despair but of confidence, of faith in intelligence, of joy in struggle and in the strenuous life. In principle at least this change is of tremendous import. All the old dualisms are going by the board. Vocation must give the abundance of life that is both culture and religion; heaven must be made to lie about us, not only in our infancy, but throughout life; faith must be faith, not in a far-off divine event, but in progressive social improvement; duty must not rest its case on "the heat of inward evidence" and seek its realization in submission to an inscrutable cosmic order, but must express itself in a steadfast loyalty to human values; and science must be viewed in the perspective of the new humanism that is on the way.

All this may be expressed simply by saying that the emerging ideal of the good life is not static but dynamic or moving. Speaking in comparative terms we may say that life on the older levels was characterized by immobility. Social classes were stratified and social usages and customs were provided with sanctions by appeal to religion or to natural right. Political power was made to rest, for the ruler, on divine right; and, for the member of a democracy, on the natural right to life, liberty, and the pursuit of happiness; matrimony became a sacrament; slavery and the institution of private property were regarded as ordained by Providence; and unquestioning obedience in political and ecclesiastical matters was inculcated as a supreme virtue. All the influences of tradition and all of man's natural loyalties were thus

organized to give human institutions the authority of revelation or of cosmic law and to ward off progress and reform.

The coming change is away from compartmentalization of interests and fixity of standards. The change that is taking place in the relation between culture and vocation is more or less typical of a change that is going on in life as a whole. We are achieving a "realizing sense" that each generation will be called on to revise its religion, its morality, its social and economic beliefs. Every important phase or aspect of life is bound up with every other, and there can be no final truth. The good life is a continuous reconstruction on the basis of sensitiveness to all human values, "not a having and a resting," in Matthew Arnold's phrase, "but a growing and a becoming." This is the ideal of the good life that poets and seers have held up to view throughout the course of history. They have told us that the wise man is a part of all that he meets, that nothing human is foreign to him, that an uncriticized life is not worth living, that culture is the power to see life steadily and see it whole. But these old truths now return to us with a new meaning. We can now see, as we could not see before, the interpenetration of part with part, the commingling of diverse strands in the seamless garment of life. We can now understand that such facile terms as "openmindedness" and "tolerance" are the designations, not of virtues, but of vices, unless they are accompanied by an honest effort to remould the patterns of our experience. More specifically, we are gaining the insight that our educational program becomes tied up with a social program. The full, rich life — the good life — that education is to help us secure requires a

social order in which the individual can attain a maximum expression of capacity. A social order in which the individual can realize this "fulness of life" through relations of understanding and sympathetic coöperation with others is essentially what is meant by the ideal of democracy.

In brief, the supreme task of education, from this point of view, is to organize its various resources and agencies in such a way that the development of civilization may be seen as a progressive liberation of intelligence. The chief significance of the changes that have been wrought by science lies in the evidence which they contribute that man is reaching intellectual maturity, that intelligence is competent to direct our human affairs. The compartmentalizing of interests, and the fixed standards, to which reference was made previously, are obstacles to the free use of intelligence for human well-being. With this new emphasis on the rôle of intelligence, man's advent on this planet takes on the quality of a great experiment, a magnificent adventure, which has no assignable limit and which gives no assurance that anything which we now hold sacred will remain permanently so. Continuous reinterpretation and reconstruction of beliefs and institutions becomes a recognized obligation. New discoveries and inventions express themselves in new outlooks, new ideals and aspirations, the worth of which is to be measured in terms of their bearing on democratic forms of social organization. This attitude or point of view becomes the guiding principle in curriculum construction, in classroom method, and in administration, with the cultivation of skills and the fostering of intellectual interests as derivative results.

We are merely approaching the subject from another

angle if we say that the course of events has brought us face to face with the problem of the place of intelligence in human affairs. What we call science is simply intelligence equipped with special procedures or techniques for the discovery of facts and the handling of evidence. Intelligence thus equipped is a relatively new force in the world, and it has proved itself a tremendously potent factor. This new factor has proved itself destructive as well as constructive. It has brought about a progressive reorganization of the social order and a progressive revision of old beliefs. It constantly sets aside the wisdom of former generations, just as in a growing city the buildings that were adequate for former needs are razed in order to make room for skyscrapers.

To recognize this fact, however, is not to answer the problem that is implicit in this process, *viz.*, the problem of the limits within which intelligence operates. For example, we may continue to improve our social organization, but can we carry this improvement to the point where wars will be abolished or where the desire for private gain will be transformed into a spirit of social service? Or must we conclude that, man being what he is, wars are bound to continue and that our present institution of private property must be maintained essentially as it is now, since these matters pertain to tendencies or instincts that are too basic to be eradicated? Or, again, we may concede that our conceptions of truth and of conduct have changed during the centuries, but can we infer from this fact that intelligence fashions its standards for truth and conduct in much the same way as it constructs machines for digging tunnels and making ocean flights? Are these standards simply devices for the effective organization

and control of experience, are they purely human and relative, or are these standards determined for us by the immutable constitution of the universe and therefore absolute in their authority? In other words, are certain things inherently right or wrong, true or false, or are rightness and truth determined by considerations of function or use?

There can be no doubt that our present outlook is shifting more and more towards the "practical," in the sense that we are placing more emphasis on the control of the material and social environment for human purposes. This change in outlook, however, does not automatically solve the problem of the place or function of intelligence in our civilization. This problem cannot be evaded altogether. It is, in fact, the basic problem of the present age. Every important issue of the times traces back to this problem. If we grant, as seems reasonable, that a liberal education must orient the individual in his world, must give insight into the drift and meaning of things and events, then a liberal education must take account of this issue which events have thrust upon us, and educational procedure must take as its chief point of departure the problem of the liberation of intelligence.

If we approach the educational situation from this angle, it is evident that the problem of mind takes on a new significance. Our answer to the questions just raised will be determined largely by the conclusions that we reach regarding the nature of intelligence. With regard to the question of intelligence, opinions vary widely, and will doubtless continue to vary. These divergencies however need not prevent us from agreeing that the problem of the scope or function of intelligence should be made

the fundamental consideration for the guidance of educational practice.

It remains to point out briefly the bearing of this approach on the selection and organization of subject matter and on teaching method. If our chief concern is to promote insight into the problem of intelligence, the subject matter will be used, in the first place, to show how intelligence has operated to change conditions of living. Secondly, it will be shown how the achievements of intelligence have widened our sense of social responsibility and our conceptions of the world in which we live. Thirdly, attention will be directed to the inevitableness of conflict between the new and the old and the necessity of continuous readjustment. Fourthly, the opportunity will be utilized, in so far as the age-level of the pupils and other circumstances may warrant, to raise the problem of the nature and authority of standards in the domain of truth and of conduct. With regard to teaching method, the teacher will constantly bear in mind that the whole purpose of this approach is to stimulate pupils to reorganize the body of their personal experiences. This result is not achieved if we simply hand out the results or products of intelligence in finished form, or if we dictate the conclusions that are to be drawn. Genuine insight requires the assimilation of the new material to old experiences in such a way that both the old and new take on a new significance. It is the teacher's function to provide material and incentives for this process, but not to do the pupil's thinking for him. The school is no place for propaganda or dogmatism.

Generally speaking, such an approach or program finds some sort of application in connection with every kind

of subject matter. Differences in subject matter, however, provide certain differences in opportunity. History, for example, is full of situations that involve standards of conduct, and so furnishes occasion for the exercise of moral judgment and for consideration of the authority or validity of standards. In science the problem of truth is always just around the corner, as well as the scientific conception of the material universe as a hard and fast mechanical system. Mathematics, on its higher levels, can likewise contribute to this scientific conception of the world, and, moreover, makes it possible to give effective consideration to the nature of concepts. The concepts of mathematics reveal a certain arbitrariness; a unit, for example, is anything that we may choose to take as such, and the decimal system is merely one of various possible systems of notation. Is this fact typical of all our concepts? Does it point to the conclusion that all concepts (including standards and ideals) are just instruments or devices for promoting human ends?

While it is true that we find certain differences of opportunity in connection with the nature of subject matter, it is equally true that an organization of subject matter such as is here indicated provides more or less automatically for the integration of all the subjects in the curriculum for a common end. The emphasis on intelligence humanizes every subject by relating it to belief and conduct. This result is procured, not by teaching on the merely informational level, but by using subject matter for the purpose of building up a perspective or point of view that has its center in the question of the responsibility which rests on intelligence in the upbuilding of our civilization. It must be repeated that the conclusion

which is to be reached must not be determined in advance. From the standpoint of the teacher the important thing is not the conclusion but the perception that the problem of intelligence furnishes a center of reference for the construction of a program of conduct or a philosophy of life.

In the end the acquisition of such a program or philosophy must be regarded as the chief result of a liberal education. It is difficult to avoid the conclusion that our complete absorption in the scientific problems of education has resulted in a lopsided development. There is a general drift or trend in the social changes that are going on to which we have not given the study which it deserves. Yet it is hardly an exaggeration to say that the problem which is raised by these changes is the central problem of our civilization. We are moving away from the old level, but what is to be our new level? The more we emphasize man's power to shape his own destiny, the more necessary it becomes to recognize the possibility that he will make a mess of it. Control over the environment may mean new incentives to the economic exploitation of our fellows, both on the personal and on the political level, and in general, a set of standards dictated by an ethical materialism; or it may mean the will to realize the poet's dream of a brotherhood of man and a Kingdom of Heaven on earth. In any event the problem calls for an interpretation and organization of values, which is not a problem for scientific research, but a problem of philosophy. It is not a problem for science because it is not a problem that lends itself to the application of scientific technique. The scientist has his own special devices for collecting and interpreting data, but these devices prove inadequate when the situation calls for a recreating

or reinterpreting of old values and old ideals. A discussion of the sort exemplified by this chapter, for example, does not properly come under the heading of any of the sciences.

If the foregoing discussion is correct, then most of the industry called the "scientific determination of objectives" is on a par with catching birds by putting salt on their tails. The value of objectives lies in their relation to an inclusive program of education. The objectives are the means through which this program is to be realized, and if we attempt to set up objectives without raising the previous question, we remain in bondage to old traditions and old ideals, despite the parade of scientific method.

It is time to recognize the fact that the study of education, in spite of all the advances that have been made, must necessarily suffer from a certain futility and triviality if we persistently disregard the deeper issues. The specialist in education is all too often a person who cannot see the woods for the trees, and who has a way of dealing with educational problems that infuriates his colleagues in other subjects. These colleagues, who are usually staunch traditionalists in matters of education, may be very much out of touch with modern educational problems, yet they have one undeniable advantage. They represent an educational creed that has behind it a long and illustrious history. This creed provided a conception of man and society and cultural values which emphasized the dignity and worth of rational living and which often had the sustaining power of religion. Our present day education is more informational and more practical, but has less of the disposition to "see life

steadily and see it whole." We have plenty of reasons to find fault with the kind of wholeness to which the classical tradition was so devoted, but we can scarcely deny that it had a certain quality of wholeness, which our present-day education has not. It is because the traditionalist senses a difference of this sort that he feels bound to regard the professor of education as a public menace. The fact that the traditionalist is hopelessly behind the times does not necessarily prove that his judgment is altogether wrong.

There are indications that the tide is turning, and that we are more in the mood to consider the social and spiritual import of the changes which have been wrought by science, in order that we may achieve a new conception of how intelligence is to function for the betterment of human life. The newer conception of the nature of the learning process gives promise of an educational system that will contribute more effectively to the disposition and power to see life steadily and see it whole, in terms of the circumstances and opportunities of the modern age.

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INDEX